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TRANSACTIONS

OF THE

MEDICAL AND PHYSICAL SOCIETY

OF

BOMBAY.

No. VIII. NEW SERIES.

FOR THE YEAR 1862.

Bombay:
PRINTED AT THE
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ON THE SYMPTOMS AND MORBID ANATOMY OF LEPROSY; WITH REMARKS.

By H. V. CARTER, M.D. (Londin.)

This terrible scourge of the indigenous population of India, though widely prevalent and pitiably destructive in its effects, has attracted but slight attention on the part either of the ruling powers or our own profession. When the same or a similar disease devastated Europe during the middle ages, public asylums for lepers were raised and endowed, and the medical literature of the time teems with notices of leprosy; in modern days too, with the aid of an enlightened government (that of Norway, where leprosy still prevails), most valuable and interesting information, adequately illustrated, has been given to the world by M. M. Danielssen and Boeck.

That leprosy is not an attractive subject for investigation, that it attacks mostly the lower orders, and is but little amenable to treatment, are probably the reasons why it has been comparatively neglected by medical observers in India; something, however, must be attributed to the incidental difficulties of pursuing the inquiry.

In articles by Ainslie, Robinson, recently Day and Van Someren, and notices in a few general works, as D. Johnson's (which I have not seen), Brett's, and lately that of Morehead, is included nearly the whole of our information on this subject; the last named distinguished writer, who well observes "the morbid anatomy of leprosy has been altogether neglected in India," is the only one who gives any *post-mortem* observations. Of these, however, it must be said that they do not reveal the essential anatomical features of the disease. Being favourably situated for the task, and knowing something of the striking results of Messrs. Danielssen and Boeck's researches, I have for some time past turned my attention in this direction, and not without being repaid, for it may be considered as demonstrated that the

morbid changes in leprosy are peculiar, if not unique, in their nature and seat; also, that taken in connection with the symptoms, they are of considerable interest in a physiological point of view.

Another common but slightly regarded feature of leprosy (the eruption) is worthy of notice.

It should be added that even in the general (or cosmic) literature of this disease, excepting the work of the Norwegian authors above-named, but very scanty information on the anatomical characters of leprosy is to be found; and as regards this exception, the results I have arrived at do not, in some very essential particulars, agree with those of M. M. Danielssen and Boeck.

Judging from experience afforded in this presidency and from published sources, leprosy is a frequent disease in India. Numerous opportunities of seeing it occur in Bombay at the Native Hospital and Male Dispensary; and at the Dhurumsala (an asylum for the homeless, under the control of the local District Benevolent Society); to these sources I am principally indebted for the facts upon which the following account is based. In the Jamsetjee Jejeebhoy Hospital from 60 to 70 lepers are annually admitted; a larger number probably attend the Dispensary in my charge; and at the Dhurumsala about 100 lepers are lodged and partly fed; it also furnishes a certain proportion of the more severe and fatal cases found in the hospital; the number of deaths in the latter averages 12 annually, and post mortem inspections are generally to be obtained.

A large majority of the cases seen in the presidency town consists of residents of the numerous fishing villages and small towns situated on the sea coast,* but in the Deccan and

* "The frequency of the disease in the class concerned in the catching and selling "of fish is very remarkable, especially as this class contributes but in a trifling pro- "portion to the general mortality. This serves strongly to confirm the opinion long "entertained that an inordinate use of fish tends to produce the disease; for the other "classes which suffer the most are also those which use fish very largely, not always "in the freshest condition; and it is interesting in connection with the fact of the "prevalence of a very similar disease, notwithstanding the great difference of climate "in those countries of Europe where the poorer population feed the most largely upon "fish, viz. Norway and the Shetland Isles, the Faroe Isles and Iceland."—*Deaths in Bombay during* 1860, *page* xii.

Dr. Haines, the Registrar of Deaths, also shows that in the last twelve years 543 deaths from leprosy have been recorded, of which 409 were males, 134 females;

Northern Provinces Leprosy is by no means unfrequent, and patients from the eastern parts of India are occasionally seen, so that it is probable examples of all the chief forms of the disease have at one time or other come under notice. Systematic notes of about 200 cases and 16 mortisections have been collected; the latter include the ordinary inspection of viscera, dissection of the nerves of one side of the body, and subsequent microscopic examination of the diseased structures; these materials being the results of personal effort, may, if deemed adequate, be also considered as trustworthy.

A simple method of viewing Leprosy would be to consider the chief groups of symptoms (or features, as they may be called) it presents; these are three in number:—

1. An eruption on the skin, probably related to Lepra (Græcorum), and accompanied by anæsthesia.

2. Anæsthesia of the skin of the face, ears, and extremities, owing to an affection of superficially-placed nerve-trunks, and cutaneous nerve-branches; the Pacinian and Tactile corpuscles (appendages of the sensory nerves) are frequently also implicated.

3. A tumefaction or tubercular thickening of the skin, and the mucous membrane of the palate, tongue, &c.

These primary symptoms seldom occur quite alone, but in all cases one or other will be found to predominate, and so the variety or form of the disease be determined; the second is the more constant and perhaps characteristic; it is generally preceded or accompanied by the first, the duration of which is sometimes temporary; the third feature is almost always accompanied by the second, and occasionally by the first.

The inevitable consecutive phenomena, as atrophy, distortion, and destructive ulceration of affected parts, which appear in

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"proportionally to the total deaths, leprosy is most prevalent among the Native "Christians, next among the Marathas and low-caste Hindoos, particularly the "latter; then follow the Mussulmans, the Parsees, the vegetable-feeding Hindoos; "one case is recorded in an Indo-Briton and two in Negro-Africans. Jews and "Europeans have been exempt from the disease." The mortality seems to reach its maximum about 30 years of age.

cases of prolonged duration, at present require only to be mentioned.

In thus giving prominence to the eruption of leprosy, I have been led by observation alone. This striking feature, unnoticed by the later Western authors, was correctly discriminated by the Arabs and some Greek writers, and I may add is almost solely referred to in the Mosaic and Hindoo descriptions of leprosy; it is the *Baras* or *Leuce*, by either of which names it might now be distinguished. The second of the above forms of the disease is that known as *Anæsthetic Leprosy*—a distinction first made by Robinson; it is also the "articular" Leprosy of medical authors residing in the West Indies and Africa. The third variety is the *Tubercular*—the "leprosy of the middle ages," and the form best known in the West; it is still, as compared with the Anæsthetic, the commonest in Europe, &c., but not in India, and here a contrast might be noticed similar to what obtains as regards the relative frequency of the two chief forms of Ague in Europe and in India.

As already implied, I am inclined to view all these three varieties as so many features of one disease: the relation the eruption holds to the others is matter of observation and not, perhaps, strictly explicable, although its peculiar anæsthetic character is wanting, so far as I know, in other skin-diseases; but that the cutaneous nerve-affection and tubercular thickening of the skin are essentially connected is admissible, from the fact of the latter being commonly associated with the first in the same patient, and both being the result of a deposit having similar characters in each, in the two structures implicated. I shall now proceed to consider these features of Leprosy *seriatim*.

1. The Eruption.

As seen at the present day, the eruption presents characters sufficiently varying to warrant some such simple arrangement as the following, which will generally hold good:—

(1.) A characteristic, if not typical form, consisting of moderate-sized, isolated, circular, and serpiginous patches scattered over the body.

(2.) In another, a very large extent of skin has become implicated, possibly by indefinite extension of patches like the above.

(3.) Again, extensive, defined, and characteristic discolourations of the surface of the skin.

(4.) Or, numerous and more indistinct pale blotches, also widely scattered.

In this summary are not included those alterations in the appearance of the skin which are clearly referrible to the local deprivation of nervous influence; such are not uncommon in Anæsthetic Leprosy. It should be remarked, however, that there is sometimes a difficulty in assigning the anæsthesia to either of these causes separately; some phenomena (occurring in the hands and feet) have induced me to conclude that the patches of eruption have a tendency to appear on a surface previously anæsthetic, though they may be exceptional; it has occasionally seemed, too, that the anæsthesia has extended along the skin, and along the sub-jacent cutaneous nerves (to a larger extent) at the same time; but the exact chronology of symptoms it is almost impossible to precisely ascertain in most native patients.

(1.) The eruption first named has the following characters:— patches or spots of a circular or annular form, size $\frac{3}{4}$ in. to 3 in. or more in diameter; edges raised, of a pinkish hue, free from scales, slightly cracked or wrinkled, centre depressed, pale, dry, glistening; a tendency to spread and join so as to cover larger spaces. The centre of the patches is insensible, often completely so, and always in the older ones. Their appearance is not preceded or accompanied by any general symptoms, or even local signs of irritation; there is nothing like hyperæsthesia at the commencement. The patches commonly occur about the shoulders (front) and hips (back), behind the elbows, and in front of the knees; on the face the temple and cheeks are frequent positions, sometimes where the branches of the fifth cranial nerve emerge; the trunk and limbs are often affected in a perfectly symmetrical manner, and there is always a strong tendency to such an arrangement. The eruption begins as a small reddish, flattened elevation of the whole skin, giving the impres-

sion of a tubercular character to it. Squamæ, discharge, and scabs are absent; even a furfuraceous desquamation of the cuticle is by no means common. The hairs on the patches are few and atrophied, but seldom blanched; the function of the glands of the skin is suspended or diminished; blood readily flows on puncture of the surface. In less marked cases the distinction of margin and centre is apt to be obscure, but anæsthesia is always present in the latter.

Cases in illustration of the above.

1. Mhowjee, a Mussulman, ætat 50, a woodman; comes from near Rajcote (sea coast). Numbness of the feet was accidentally discovered about 12 months since, and spots appeared near the elbows, &c. Is strong and in fair health. There is doubtful redness and numbness of the cheeks; the lobules of the ears are benumbed. On the trunk, front, and back are to be seen numerous small spots or patches, varying in size from 2 lines to 2 inches in diameter, and mostly of a round or oval form; the smaller consisting of mere light-reddish elevations of the skin; the larger of distinct circles, the centre of which is depressed and of a pale-yellowish colour; the margin broad, raised, light-red; at a glance they have something the appearance of "wheals;" the surface is rather rough and dry; the hairs grow scantily, but when present are by no means invariably white. On the shoulders, outer side, and back of the arm, especially about the elbow, also on the outer side and back of the fore arm, may be seen similar spots; on the nates a few are present; none on the thigh, but some on the front of the leg; there is also an undefined light tint about the knees. The spots are numerous; they are all benumbed, especially the centre of the older ones. There is slight but evident anæsthesia of the dorsum of the hands and feet, without any distortion of the latter. No kind of uneasiness accompanies the eruption of the spots; he never has fever; denies an hereditary or syphilitic taint. (Dispensary patient, No. 55.)

2. Tah Mahomed, Mussulman, ætat 53, a pensioner, comes from near Nassick (Deccan); 2 years sick. On the body is an eruption of circular patches, the centre of which is pale and comparatively depressed (sometimes really below the level of the skin); the margin broad, raised, defined, of a purplish hue; the cuticle is entire over both, wrinkled and dry. On close examination the hair follicles are found to be distended, the hairs frequently absent or atrophied, not blanched. The diameter of these patches varies from $\frac{3}{4}$ in. to 3-4 inches; they are present on the nose, temples, cheek (right side of face), helix of both ears, neck, shoulders, arms, and forearms; on both mammæ; there is one exactly on the middle line behind, others on the nates, right thigh, leg, and foot, and also on the opposite a few; they first appeared

on the right thigh close to the knee, on the inner side, and the patch there is still the largest; one spot is just below the attachment of the *ligamentum patellæ;* the most recent (15 days ?) is on the opposite thigh; its diameter is about 6 lines, colour reddish-purple; it is raised, with a mere trace of a central pale part; no tenderness, but loss of sensation. At a short distance these patches have a whitish glistening aspect, which is attributable to very thin, dry flakes of cuticle, or to a similar state of the general surface, without distinct scales being apparent; their number is about 20, and they are all without exception quite benumbed in the centre; being sharply pricked blood exudes.

About the time the patches first appeared (2 years since), he accidentally discovered that the right hand was weak and benumbed, the two inner fingers are slightly atrophied, and remain a little flexed when at rest, their palmar surfaces, especially of the first phalanx, wrinkled, shrivelled, and of a purplish tint; also the whole length of the inner third of the palm of the hand is shrivelled slightly and livid, the difference being perfectly clear to the eye; these parts are benumbed except close to the wrist, and also the dorsum of the two fingers beyond the first phalanx; their temperature is notably diminished. The whole hand is weak, and the *interossei* are atrophied, particularly of the first space. The *ulnar nerve* of the same side, about an inch above the elbow, forms a firm and tender swelling running upwards for about two inches, which, when pressed, causes pain in the forearm and starting of the two inner fingers; this swelling was first noticed about the time of the numbness; it cannot be confounded with enlarged lymphatic glands. General health fair; never has fever; is married, and has a grown-up family and grandchildren, who are all well; knows of no taint of leprosy in his family; has had syphilis on more than one occasion, many years since. (Dispensary patient, No. 48.)

3. Rajal, Mussulman, ætat 30, a weaver. Six months since "wheals" began to appear on the body passing into light-coloured raised patches, with reddened edges and depressed centres; they are present in the abdomen, back, shoulders, back of arm and forearm, and also on some of the fingers; within the last 12 days fresh spots have appeared on the forehead and face, exactly where the three branches of the fifth cranial nerve emerge. Ears unaffected. There are indications of slight facial paralysis (r. side). The old spots are perfectly anæsthetic; the new ones less so; none are particularly tender; their appearance gives the impression of a gelatinous-like effusion; at first red and shining, afterwards lighter than the sound skin, becoming depressed in the centre. General health fair; a short time since had fever; manner heavy; no hereditary taint known. (Dispensary patient, No. 33.)

I had selected three other cases as illustrations of this form of eruption, but it will not be necessary to detail them; two are of long standing and accompanied with anæsthetic leprosy.

(2). The transition from isolated to blended patches is a natural one, and in some cases, at least, it is only a question of time; but I doubt if in all or in most; evidence of it will, however, be found in the following case :—

4. Chinapa, a Hindoo, ætat 50, comes from near Mangalore (coast). The disease is of upwards of 30 years standing; it commenced with anæsthesia of the left foot; the eruption followed, and a few years since the hands became affected. Health tolerable; is intelligent; denies syphilis. The face is not affected in any way, nor is anything to be seen on the front of the trunk; on the back, including nearly the whole of the left shoulder, and encroaching on the right side, extending as high as the nape of the neck, and reaching downwards to the level of the last rib is a discoloured patch, the surface of which is uniformly lighter and redder than the sound skin, and appears dull and dry; the edges are wide, defined, broad, and lighter coloured towards the patch; on the opposite margin at the juncture with the skin, numerous isolated, flattened, red, or purplish tubercles are seen covered by the thinnest cuticle (only in the smaller patches amounting to anything like a scale); isolated tubercles may also be seen at a little distance from the edge, and others in the middle of the large patch, where probably sound skin has become inclosed. There is clear evidence of a primary circular or annular arrangement, especially in the new spots. One is present below the large patch described above, about the size of a rupee, and oval in form; already the centre is depressed; the edges irregularly tuberculated. Quite recent spots may be seen on the right forearm, as commencing by a cluster of flattened, light-red tubercles, a line or two in diameter; then spreading the centre subsides, acquires a darker reddish tint, while the lighter raised margin extends. Perspiration is deficient on the affected surfaces, and the hairs stunted, sometimes white. Sensation is more or less deficient in the patches, except the most recent of all. The hands are benumbed and distended, particularly on the left side; the left lower extremity is benumbed below the knee, and the foot is nearly destroyed. No general or local symptoms precede or accompany the appearance of new spots. He states that his mother's brother had leprosy; other relations and children unaffected. (Dhurumsala, No. 62.)

5. Deojee, Hindoo, ætat 45, comes from near Herni (coast); has been 18 years sick. There was first a patch on the nates; the hands and feet only recently affected. On the face are light-coloured patches; there is numbness also, and the ears are benumbed; the eruption on the trunk (back) consists of large, irregular, but often rounded patches, measuring five or six inches across and more or less blended; their colour is a uniform light red, and the surface is slightly raised, but after attaining a certain size, the central part acquires a dark colour, like the sound skin, but the supple smooth appearance of the latter is wanting. In these patches the raised margin is not apparent, as the

whole surface is equally affected, except in the oldest ones; no tubercles are to be seen along the edges; the older ones are benumbed, that on the nates completely so; the more recent but slightly. There is anæsthesia of the upper extremities, and slight distortion of the hands, also below the knees, and the great toe of the left foot is destroyed. He never suffered from syphilis; leprosy is said to be in his family, but he is the only one now affected. (Dhurumsala patient, No. 84.)

6. Murya, Hindoo, ætat 30; a ryot, from Ooran (coast); duration of disease 4 years. It began with numbness of the legs, and an eruption which spread upwards, and soon after the right hand became affected. Face—slight tumefaction and coarseness of skin of brows, cheeks, with diminished sensation; hair scanty or small; lobules of both ears benumbed, and rim of the right also reddish and swollen. Something like thickening of the mucous membrane along middle line of hard palate. Trunk marked with numerous pale, red, raised, level patches of irregular form; the smaller rounded, others are large, and surround the waist like a girdle; on the back and chest are seen discolourations similar to those included under the next head; perhaps remains of old patches. Extremities, upper—similar patches on the shoulders, arm, and forearm, with, on the right side, partial destruction of the hand, on which bullæ appear, leaving white scars; the ulnar nerve is evidently affected. Lower—on the nates, thighs, and legs are other broad, light-coloured, raised, and connected patches, presenting a characteristic appearance; the feet are benumbed, and the toes of one partly destroyed. The centre of the large patches is depressed and pale; rather lighter, drier, and more finely wrinkled than the sound skin; it is benumbed, and the patient himself describes how the patches spreading leave this benumbed surface; but inclosed pieces of sound (?) skin also seem to have lost their sensation in some places, so that, as is very probable, the cutaneous nerves are also diseased beneath the patches. This case is of considerable interest, as exhibiting a form of skin-disease which appears to me altogether characteristic of leprosy. (Hospital patient, No. 72.)

7. Rosa, a Portuguese woman, of about 30 years of age, comes from near Bassein (coast). Four months since the eruption appeared on the face, and has since spread downwards to the trunk and extremities; there were no premonitory or general symptoms. She is in good health and intelligent: never had syphilis. The eruption consists of raised, rounded spots of a livid-red colour, and in size varying from four lines to as many inches across; they are very numerous, and blending, nearly cover the face, forehead, and ears; but few on the trunk, and those small and isolated: mammæ normal. On the outer and back part of the arm and forearm, and on the dorsum of the hand, others are seen; in the thighs are larger patches, at the back, and about the knee, also on the front of the legs. The spots blend, producing broad irre-

gular markings, and some are in the form of complete rings; the margin broad and raised, the centre small, depressed, and almost resembling sound skin; they impart a peculiar expression to the face, looking at first sight like tubercular thickening. All the spots are unmistakeably benumbed, and that to a considerable degree, the skin in the neighbourhood being normally sensitive. There is, however, evidence of nerve-disease in the benumbed condition of the skin of the forehead at the lower part, and of the dorsum of the hands and feet, which are also much bronzed and generally wasted, but no destruction of parts has yet taken place, only the fingers, &c. are thinned and rather stiff; the palms of the hands are yet partly sensitive, but deterioration of structure has evidently commenced. There is a broad, red, thickened line along the middle of the hard palate. The disease is increasing. She knows of no hereditary taint; her husband is dead; no children. (Dhurumsala patient, No. 108.)

This case resembles the last, and it also shows how the eruption may approach, in some of its characters, to ordinary tubercular thickening of the skin, indicating, as I shall have further occasion to point out, the evident connection there is between baras and tubercular leprosy.

(3.) A more frequent appearance than either of the foregoing, is a light discoloured state of the skin in the form of large patches, the surface of which may present hardly any other changes beyond those of colour and sensation; but the often rounded form (particularly when small), defined and slightly raised, reddish margin, and dry, shrunken, anæsthetic centre—characters sometimes common from the very first and imparting an aspect which to an experienced eye at once reveals the nature of the disease—clearly connect this form of eruption with the preceding; it seems, too, highly probable that the cutaneous affection in leprosy is of a specific character, although this may not be very evident in all its modifications.

8. Harri Sangla, a Hindoo, ætat 30, native of Chiploon (coast.) Twelve months ago he found the left foot to be benumbed and soon after spots began to appear on the body. Never had syphilis, and is in good bodily condition. The entire expanse of the forehead, the whole of the left cheek and a part of the right, are of a light colour, although the skin is otherwise unchanged in appearance, except in the left cheek where it seems rather flushed and puffy; here sensation is particularly diminished, but also lessened in the other parts, and lobule of right ear. On the nucha is a reddish patch; in

front of the trunk are two large, circular, almost white patches with defined edges, level, slightly spotted, and supple surface; a much larger single patch of less regular form and definition, but otherwise identical, is found on the opposite side to these, and scattered about are a few white spots; numbness exists in these places, particularly in the larger one. On the shoulders, arms, back of elbows, and outer side of forearms are numerous, often large, patches, of somewhat irregular form, but frequently rounded, of light reddish tint, dry and roughened surface, edges not perceptibly raised; in some round spots the centre is darker than the defined broadish margin; they are not quite symmetrical; some of them (*e. g.* on the shoulder) have an appearance not unlike (1), are slightly raised at margin, depressed and pale in centre. There are patches on the dorsum of both feet, where the skin is thin and shiny and coarsely wrinkled, an appearance different to that of other spots: over all these places sensation is deficient, and sometimes absent altogether, while the intervening skin of sound aspect is sensitive as usual. The fore-finger of the left hand is benumbed, dry, and shrunken. On both nates are large coarse patches, having a light reddish margin and darker centre; also in front of both thighs, knees, and legs are similar ones extending, on the left side, to the dorsum of the foot, which is partly destroyed; there is anæsthesia of the patches, and of the skin supplied by the musculo-cutaneous nerve. No hereditary taint. (Dispensary patient, No. 65.)

9. Rama, a Hindoo, ætat 55, from near Poona (Deccan), 7 years a leper: first were present anæsthesia and blisters on the toes, afterwards the hands were attacked, subsequently the eruption appeared. He never contracted syphilis and denies an hereditary taint. There is numbness of the ears: on the trunk are large light-coloured patches, those on the front are not raised, those on the back are, and show a tendency to form circles, or rings; here sensation is diminished, it is absent in the flattened (and older?) patches, where, too, the surface is dry and harsh: the hairs grow nearly as usual. Upper extremities—small patches of both kinds may be seen, benumbed and of circular form: the hands are much deformed, especially the left: the lower extremities are similarly affected with patches, numbness, and distortion. The new spots appear to arise by isolated round small marks. (Dhurumsala patient, No. 82.)

10. Elia, a Jew, ætat 26, from Cochin; duration of disease 5 months. On the back (left side), in the loins is a large irregular patch of a light red colour, defined edge, doubtfully raised in parts darker in the centre, and quite benumbed; other small patches of a rounded form and light red colour, all more or less benumbed, are also present: on the arm and forearm are two or three such, and a similar number on the leg and thigh. Their size at first is not $\frac{1}{4}$ inch, and they spread in a serpiginous manner. No other signs of leprosy; he probably never had syphilis, and denies an hereditary taint: looks strong and well. (Dispensary patient, No. 76.)

11. A boy (Hindoo), ætat 10 years, from near Ooran (coast), states that about 5 years since the disease began. There are numerous light patches on the trunk where the skin is dry, harsh, and glistening; others on the face. The eruption is mostly a simple discolouration; the smaller spots do not show either pimples or tubercles, but are frequently rounded: the larger have, on the extremities, a distinct raised edge: tubercular thickening is present in all the large patches, to a small extent, giving in some places the idea of a cicatrix from a burn, or cheloid bands. On the face however are distinct raised reddish configurations, placed on a uniform light discolouration of the skin, which invades almost the whole mark, leaving some places, *e. g.*, one half of the upper lip, free; hairs little affected. Sensation is wanting in all these discoloured places, and also in the limbs, except the palms and soles. The father of this boy died in the Dhurumsala of leprosy 5 years ago. (Dhurumsala patient, No. 103.)

I have notes of other cases which, like the first and last of these, seem to indicate a close connection between the several forms of eruption, and also with tubercular thickening of the skin; and of many others presenting the kind of eruption now under notice; two, in old women, are very much alike; but those above given may perhaps afford an adequate conception of the appearances.

(4.) In not a few instances, however, the character of the eruption remains obscure, even from the first: it is evidently something more than a mere change of colour, for there is a 'method' in its commencement and extension, and yet it cannot be said to be either tubercular or papular. Perhaps the occurrence of this form is quite peculiar to leprosy, and it may indicate an extreme degree of modification of those previously described. Numbness more or less marked is usually present, but I have noticed its absence in spots on the face, occasionally. A few illustrative cases will give the best idea of this form of eruption.

12. Changi, a Hindoo female, ætat 25, comes from Bancote (coast). There have been spots in the body for 12 years; they first appeared on the left forearm: at present a few, rather indistinct and the size of a rupee, may be detected on the face: all over the shoulders, front and back, on the chest, abdomen, and loins, and extending onwards to the extremities where they become fainter, are light discolourations perfectly distinct to the eye, even on her pale skin: they are generally large, and defined at the spreading borders,

but towards the extremities pass insensibly into a colour resembling that of sound skin, portions of which probably yet remain within the circumference of the patches: the free edge often shows a circular disposition. The more recent spots are decidedly circular in form, or occasionally oval; on the back, they show the faintest red edge, slightly raised, then a broad light surface, and finally, in the centre the colour may be almost white: the surface presents rather a coarse appearance, the clogged hair-follicles being visible, as elongated dots: most of the hairs are white, thin, and short, as seen with a lens. There is marked anæsthesia in all the patches. The hands are benumbed and partly distorted, and the cuticle is apt to peel off the numbed surface. Otherwise well-formed and in good health: her paternal uncle had leprosy and was in the Dhurumsala: is married and has children, but her husband has driven her from home on account of this disease. (Dhurumsala patient, No. 7.)

13. Tulsi, a Hindoo female, ætat 20, from Shapoor (Concan), like the last patient, a shoemaker by occupation, has for 8 years been the subject of leprosy. It appeared by two spots on the cheeks which spread over the face: then others came on the trunk. No general or local premonitory symptoms: general condition good. There is no distortion of the face but numbness of the cheeks, chin, forehead, and ears: hairs intact: on the front of the body, on the back, shoulders and hips are large patches of a light colour, irregular form, and not raised above the sound skin: they are defined, but have no raised edge; there is sometimes a narrow red margin but no trace of tubercles or pimples: they probably begin as small white points; the newer ones are round with a reddish edge, and a little raised: their surface looks rough and dry, perspiration being deficient. In these patches sensation is impaired, and sometimes absent. The discolouration has invaded the upper extremities which are everywhere benumbed, and the two inner fingers bent, with atrophy of the *interossei*: the lower extremities are similarly affected: numbness everywhere, but no distortion of the feet. There is no hereditary taint, but her father married another woman before her mother, who had leprosy and died of it: a girl was born of this marriage a year before the appearance of leprosy in the woman, and is now living and well: her own sister, a few years younger than herself, is affected in a precisely similar manner, and there is a younger one yet well: has no brothers. (Dhurumsala patient, No. 13.)

The similarity of these cases is too striking to be accidental: it is probable that they are fair examples of a well-defined form of eruption; I might add several others by no means dissimilar, and also mostly females.

In connection with these, rather than in the first set of cases, should perhaps be placed certain examples of scanty, small, isolated white spots occurring in leprous patients, which may be one mode of commencement of the larger patches, or else modifications of those described under (1). The two instances I have seen were remarkably alike in *all* particulars: one may be detailed.

14. Chinaya, a Hindoo, ætat 20, from Mangalore; a tailor by trade. About seven years since a small white patch appeared at the right elbow, and spread around; its extent is now visible but not entirely defined, its character serpiginous: a similar spot came on the chest, near the left mammæ, and recently another on the right side: on examining the two last, they are found to be composed of small white tubercles clustered in a circle, the centre of which is slightly depressed and rather darker, though less so than the sound skin (which is unusually fair for a native, and fine and supple): the diameter is nearly an inch. It would also appear from his account that another recently appeared on the right hand, where now the anæsthesia exists, but traces are barely visible: the older patches are quite insensible. The right hand has lately shown all the appearances indicative of disease of the ulnar nerve, and there is some tenderness with probable enlargement of the latter, near the elbow-joint: the hand is so weak that he cannot feed himself. The disease is in the family, his maternal aunt being affected: he is a fine strong-looking young man. (Dispensary patient, No. 50.)

Diagnosis.—Such are the various appearances of the skin which are seen in cases of leprosy, there may be others, similar or not; and there are skin-diseases of an ordinary character not unlike one or other of them. Although arranged under separate heads, I do not intend to assert that those I have distinguished are all separate species, the question will rather arise, are *any* characteristic of leprosy? This I am very strongly disposed to answer in the affirmative, and only regret some of the drawings of the more characteristic in my possession cannot be reproduced, so that a clearer impression of the appearances might be afforded than may perhaps be gained from the notes only. But while maintaining their pathognomic character, I admit that there are several points in which they agree with well-known skin-diseases, such as lepra, &c., these points of agreement, indeed, will form

the ground on which the subsequent historical remarks are founded.

At present it need only be observed that the raised, flattened, smooth, livid swelling described by some authors (I believe, amongst others, by Messrs. Danielssen and Boeck) is not to be confounded with any of the above forms of eruption; it belongs to the tubercular variety of leprosy. In this country, some apparently similar affections may be seen which require a brief notice: first, there is a rare eruption consisting of rounded, raised, flattened spots of a pale tint, covered with a thin cuticle which readily desquamates, and is very tender and vascular: the colour is like veal's flesh; there is a tendency to form excoriations, but most seem to subside, leaving small level (slightly depressed ?) smooth, livid, shining marks, not unlike the cicatrice of small-pox in natives, only less uniform in size and not so puckered. I quote from a well-marked instance which left some doubts in my mind as to its real nature; in the only other similar case seen, patches of "Baras" occurred at the same time, so that its co-existence with leprosy, if nothing more, was clearly possible. Next, a much more frequent skin disease called variously "gachkaram" (properly "gajacharma") "dadur," "dinah," maighum," * occurs, which much resembles ordinary lepra; large, rounded, scaly patches, accompanied with local irritation and often thin discharge, are seen particularly around the lower part of the waist and groins, also in other parts: this is certainly not connected with leprosy, though mentioned as such by the Hindoo authors, who like their successors in Europe, included many skin-diseases under that head. Again, very often in natives we see palish spots on the skin, often clustered, and common about the neck, &c., which are also innocuous: an intelligent patient told me they are known as "sibbla." I have once seen this appearance in a leper who, however, himself spoke of it as "kuchh nahin"—not worthy of notice. Ordinary skin-diseases as herpes, eczema, scabies, &c., are common enough, but

* Popular names for the patches in leprosy, &c, are "Nitah," "Chattar;" a red and white kind being distinguished.

except "gachkaram" (lepra?), the scaly eruptions are not so: perhaps, the habits of the people, and the climate, have some influence in this respect. Syphilitic eruptions of various kinds are often seen, papular, scaly, tubercular, but I have not found any difficulty of diagnosis to arise hence. Some remarks on that singular bleaching of the skin, so striking in natives, I shall reserve till the end of this summary; also a notice of a black discolouration.

Morbid changes in the Skin.—These have not been thoroughly ascertained: no doubt a deposit in and below the cutis is the cause of the elevation of the surface of the skin, impairment of sensation, and (partly) change of colour, when these are present: on one occasion a pale discoloured patch (3), which was much less evident after death, was minutely examined, and it was noted, after comparison with a similar section of sound skin taken from the neighbourhood, that the pigment in the cuticle was less abundant, and it and the cutis atrophied: sweat-ducts smaller than natural ($\frac{1}{800}$-$\frac{1}{600}$ in. diam. to $\frac{1}{444}$ in. normal) much less clear and surrounded by a deposit marked with clear small nuclei: the same kind of deposit was also scantily seen about the hair-follicles, and occasionally in the meshes of connective tissue near to the cutis, sometimes branching as if enveloping a blood vessel: nerves (?) were seen in meshes, and then, approaching the surface, suddenly becoming taper-like, but free from deposit around them: hairs small and few, and sebaceous glands very scanty. These alterations of structure would, to a great extent, account for the symptoms.

Historical notices and Identification of the eruption in Leprosy.—A very cursory inquiry into the history of leprosy (particularly as it shows itself in the east and the tropics) will elicit the fact that a cutaneous affection was early recognised as connected with this disease; thus the *Leuce* of the Greeks (Vitiligo, 3rd species, of Celsus) was a light-coloured spot, having a depressed surface, on which the hairs were white, and which when pricked exuded a colourless liquid: it was considered incurable and very

destructive in its course. Hippocrates and Galen state that it sometimes passed into Elephantiasis (Græc.) Under the term *Baras* the Arabs also recognised a similar eruption, and further, the spots are noticed as insensible: "the disease is seated not only in the skin, but in the flesh and bones, and often terminates in leprosy." Bateman, Good, Adams, and others have endeavoured to identify this skin-affection, but with no great success, because the eruption of leprosy was barely known to them. Bateman, indeed, who seems to me the most acute and accurate of our modern authors, thought he recognised in the description of Anæsthetic Leprosy by Robinson this Leuce or Baras, but, as I think, the data were inadequate for satisfactory comparison. Both he, and Willan previously, expressed the want of a full description of the eruption accompanying leprosy, as well as others occurring in the tropics; for the present, as it is the first attempt to supply this information, some indulgence may be claimed, and I trust accorded. The difficulties are not so much in what we now observe, as in what the ancient authors described; and it is not imputing to those belonging to our profession a special blame that they confounded things which differ, for, according to modern critics, few if any are to be wholly relied upon. Names of diseases have been employed in a very inexact manner, losing their value both by having their application extended from perhaps a single affection to a whole group (of which a better example could not be afforded than the word lepra), or by being transferred to a different disease (and no better illustration could be given than the use of the same word by certain translators). The following table expresses the result of my inquiries: finding it impossible to satisfactorily identify the terms used, I have placed them in such a manner as to indicate where the confusion exists, the brackets serving to show the two affections undiscriminated by the terms enclosed.

Table of Synonymes.

Names. Modern.	Lepra, and other diseases.	Leprosy. Eruption. Anæsthesia. Tubercles.	Elephantiasis.
Greek.		Alphos, Melas. Leuke. Elephantiasis. Leontiasis, &c.	Unknown to them.
Translators of Arabs.*		Morphœa alba, nigra. Albaras nigra. Baras. Albaras alba. Lepra.	Not mentioned.
Arabs.		Behek, white & black. Beres, black. Beres (white). (Berek.) Jezam. Da-al-Asad (Lion-disease).	Da-al-fil (Elephant disease).
Mosaic.		Boak, Berat Cecha. Berat lebena (?)	
Hindoo (Marathas).		Shvet-kusta. Guleet-kusta Sunbahiree. Ructa-kusta Ructa-pittia Maha-viadhi.	Ras, Godh, (H. H. Wilson)

The various kinds of eruptions seen in leprosy are, in my opinion, intimately related; so much so that they may be regarded as modifications of one specific form, or at least generic group. It is freely admitted that they present several points of affinity to some other skin-diseases, but even supposing them to be specifically the same as one or other of these, the modifications they have undergone in that great constitutional malady are yet characteristic or pathognomic. It will be afterwards seen that it is with lepra (after Willan's limitation of the term) most salient

* Stephanus Antiochensis, the translator of Haly Abbas, is an exception, he more correctly terms Beres, *Lepra*; and Jezam, *Elephantia*; this was an approximation to a right precision.

characters agree, such as the absence of local irritation, circular form, raised tubercular edge, serpiginous tendency, and especially the disposition to appear around certain joints, as the elbow, knee, &c.; and this striking fact seems to afford an explanation of the discrepancies formerly attending the use of the term Lepra, as well as of its first application to signify Elephantiasis (Græc.) or Leprosy.

There are several curious, almost anomalous, skin-affections yet noticed in Europe, which are probably also connected with this group, and the same impression has occurred to one of our best authorities—Erasmus Wilson: his synonymes I believe to be often erroneous, but there are, I think, sufficient grounds for separating lepra from other "squamæ," and even for classifying it with kelis, lupus, elephantiasis (Græc.) as he has done, if not for ranging the whole as "diseases arising from special internal causes." My own observations tend to show that lepra and the eruptions noticed in leprosy (in the east, its birth-place) are essentially related to each other, the former being possibly a modification of the latter, attributable to decay of type, climate, or constitutional peculiarities, and it is not improbable that lupus, vitiligo, kelis, morphœa, are similarly related. As to the scrophuloderma, I give no opinion; they are certainly uncommon in India: nor do I pretend to criticise Wilson's view of the identity of any of these diseases with syphilis: that leprosy and syphilis are identical, I have not seen or read anything to really prove.

On comparing leprosy as it now appears in the east and some parts of the tropics, and the west (in recent as well as former times), the most striking differences will, I think, be found in the frequent presence of a peculiar eruption and the comparative rarity of those tubercles in the skin which are the cause of the huge mis-shapen distortion of the face, ears, &c., so generally associated with the idea of that disease. I refrain from speculation on this interesting topic, but we may suppose that the former of these differences partly explains why the translators of the Arabian authors were led to make use of the term *Lepra*,

already employed to designate a (badly defined) class of skin-diseases, in interpreting the *Baras* and *Jezam* of the Arabs (both varieties of true leprosy and commonly accompanied by a lepra-like eruption), and thus to introduce much confusion in the meaning of this term: the mistake (if wholly a mistake it were) was not unnatural, more particularly as in their days leuce was probably classed along with lepra; besides, an elephant-like distortion of size is not frequent in eastern leprosy, and therefore the Greek word for leprosy would be generally inapplicable; not to mention the fact that the Arabs had already their *Da-ul-fil*, or elephant disease, meaning thereby a totally distinct affection from leprosy. Admitting the force of these remarks, we ought not so severely to blame these translators as has been done: they endeavoured to express, too forcibly indeed, the common features of leprosy as known to the Arabs, but unfortunately they adopted a word already employed in a different and too indefinite sense.* It is singular to notice, however, that this term lepra held its ground, so that subsequently elephantiasis, leontiasis, &c., came to be regarded as species of lepra; and in quite modern days it was similarly understood by both Heberden and Cullen, who pronounced lepra (leprosy) to be very uncommon or unknown to them.

I now proceed to make a few remarks on the similarity of some modifications of lepra commonly so called, and the eruption in leprosy, more especially the two first varieties described above; these chiefly refer to the absence of 'squamæ' or scales in the former; a peculiarity so striking as to considerably diminish the precision of Willan's definition. Rayer, and Cazenave, and Schedel have noticed this, in Paris: the former

* "The only description of leprosy known in El Hejaz (Arabia) is that called 'Baras;' it appears in white patches, seldom attacks any but the poorer classes, and is considered incurable."—'El Medinah and Mecca,' by Lieut. Burton, vol. II. p. 182, published a few years since. Unless the disease has changed, which there are no grounds for assuming, it may be readily conceived how these Latin translators would be led to adapt the term lepra, and not elephantiasis, to a complaint essentially marked by a skin-disease, such too as I have shown to really present some of the characters of the lepra of the Greeks.

states, "I have moreover observed lepra under another form, that, namely, of arcs of circles a few lines in diameter, red, prominent, devoid of scales and bounding surfaces of various extent, occasionally as much as five or six inches across, the skin of which had either a yellowish cast, or appeared perfectly healthy," it generally occurred on the trunk, but also on the fore arm and hand. Cazenave and Schedel say, "It (lepra) sometimes appears with very different and very remarkable symptoms. Thus, for example, the eruption deviating from its ordinary course appears in the form of small red circular points, which unite at their edges, and by their eccentric arrangement acquire an enormous size: the patches are not covered with scales, or if they happen to be so, and these fall off, they are not renewed:" instances are mentioned which seem to me very similar to those described under (2). It is true neither of these observers notices any diminution of sensation in the patches, so characteristic of the true leprosy-spot, nor anæsthesia of other parts, as commonly accompanies it here, and I admit this omission is important, but the force of the observation remains that lepra is not always a scaly but sometimes rather a modified tubercular skin disease; and this feature alone will serve to partly assimilate the characters of Baras as described above, and of Lepra. Finally: the question may again be asked, are not these two skin-diseases allied? it is not, perhaps, susceptible of satisfactory reply, but there are, in my opinion, grounds for answering it in the affirmative: the peculiar feature of anæsthesia would lead to the view of the eruptions in leprosy being a form of lepra occurring in a leprous subject rather than the lepra of Europe being a remnant of leprous taint, though this view is as tenable as Wilson's, that it is connected with the syphilitic diathesis.

The Leprosy of the Jews.—Whether this were really a variety of the disease known as leprosy at the present day or not, is difficult to determine: in the Mosaic account it is described as a series of affections of the skin, which would lead us to suppose it was similar to leuce or baras, and the diagnosis was made to

depend upon appearances not unlike those of leuce; the white glossy aspect, depressed surface, and blanching of the hairs being the most striking. The probability of the Jews becoming tainted with leprosy during their residence in Egypt, where the disease is known to have prevailed, and the general belief of antiquity, are also in favour of this view: and it may be further urged we are not to look for a scientific description in the Mosaic records. After making every allowance, however, the proofs of identity are not satisfactory; putting aside the fact that more than one skin-disease is certainly included in the account in Leviticus, ch. xiii., and the otherwise inexact application of the term leprosy to inanimate objects, we find no reference to loss of feeling in the spots, or in the hands and feet, or to distortion and destruction of these parts, or to any of the symptoms of tubercular leprosy. The mode of distinguishing leprous spots is also peculiar, depending upon changes they may undergo in the course of one, two, or three weeks; this would hardly assist in the detection of the eruption of leprosy as we now see it, for its progress is so slow that months elapse before any change occurs. Such are the chief grounds on which it might be argued that the disease was really not leprosy at all, but a collection of inveterate cutaneous eruptions, most arising from neglect of personal cleanliness, and to be remedied accordingly; while others, perhaps, scaly and tubercular, were rather constitutional. I should, myself, have come to this conclusion, if I had not found in other ancient accounts of leprosy the same confusion and omissions, making it almost impossible to arrive at satisfactory results. It is worth notice that the Jews are now seldom affected with leprosy; I have seen only four cases, and, as stated in a previous note, no deaths from this cause have happened among the Jews during the last 12 years in Bombay.

"*Kushta, or Leprosy, as known to the Hindus.*"—This is the title of a valuable article by H. H. Wilson (Vol. I. of Trans. Med. Phys. Society, Calcutta, 1825), briefly referred to here as showing that the manner in which the subject was treated by Hindoo authors is similar to, but more precise than, that of

Moses. Eighteen varieties are distinguished, seven chief, eleven of less importance, the distinction being founded on the "appearance and discolouration of the skin, and other incidental modifications." Some of the former are no doubt identical with the eruptions now seen, and described above; and amongst the latter it is easy to recognise others now known by the same name although not of a leprous type. Of these last or secondary forms, the species first mentioned is "ekakustham," also called "gaja-charma," or "elephant-skin." This I conclude to be the scaly disease before referred to as popularly named "gaj-karam": thus the Hindoos, like the Arabs and Greeks, had an "elephant" disease; amongst all three nations, however, the idea to be conveyed was different, and consequently the diseases indicated of a perfectly different nature. In all these eighteen varieties I find no reference to anæsthesia either of the spots, or the extremities, &c., nor any marks, beyond the attendant eruption, of either anæsthetic or tubercular leprosy. This seems strange, for we cannot suppose this wide-spread disease to have quite changed its characters in the course of a few centuries; how is this total absence of allusion even to the most striking and peculiar feature of leprosy to be explained? Slowly indeed has plain observation been liberated from the trammels of traditional methods and inveterate preconceptions! The Hindoo is an improvement on the Mosaic, the Arab upon the Hindoo, and yet perhaps the best and most precise: it is reserved for the moderns to make the next step, aided by means of investigation till now unemployed, though not yet perfected.

Albinism.—There is a very striking and well-known blanching of the skin which in the dark native produces a curious and rather repulsive appearance; I mention it here, having heard the suggestion that it is the kind of leprosy of old sometimes called "snow white," and the force of the simile cannot be denied, for the albinism is so complete, though of a somewhat chalky whiteness, as to equal the tint of the fairest European. The hairs of the head, &c. and the eyes are unchanged, and the functions of the skin uninterfered with. Cases are not uncommon; I have

before me notes of 10, of which 4 are females (3 Parsees) of adult age, the age of the men is generally less: in two cases the affection has existed for about 25 years without any impairment of health, in others for 10 years, and in one since infancy; I have seen very young children marked with it. The most frequent position at commencement is the hand, next the foot, and face; the spots are often perfectly symmetrical; they begin by minute white points, and spread so as to invade the entire surface; constitutional and, usually, local irritation are absent. In two cases it seemed hereditary, and in two or three connected with leprosy which is worthy of notice: a syphilitic taint is generally not observed. One instance may be related as presenting some unusual features.

15. A Mussulman, ætat. 28, from Mandavie; a wood-seller. The following parts are affected,—lips, within the nose, inner canthi: front of sternum; both elbows, front of forearm near the wrist, palm of hands, dorsum, knuckles, and fingers: whole length of shins, soles, and dorsum of feet: scrotum and inner part of the thighs. The spots are level, and white, irregular in form and size; the hairs on them white, and surface rather dry though otherwise healthy; they are quite symmetrical, except the one in the sternum, and largest on the hands and feet; they are still spreading. It is ten years since the first appeared: some recent spots are reddish in colour, raised, the seat of itching sensations, and when scratched blood exudes: the glands in the axilla are inflamed. He is in good health and condition, but complains of the heat, and burning in the eyes. No spots are to be seen in the mouth. He states that his elder brother is affected to a much greater extent than he, and his paternal great grandfather had spots on his feet; there is no taint on the mother's side: he has no children.

Black discolouration of the Skin.—This is worthy of brief notice and is not very unfrequent: the colour may be compared with that of plumbago, or it may be bronze-like. I have short notes of seven cases, in which it has only occurred on the face, usually on the forehead or the cheek just below the orbit, sometimes in the course of the branches of the fifth pair. The functions of the skin are not affected. This curious disfigurement is not connected with a syphilitic taint; once it appeared in a patient tainted with leprosy, and I should remark that a bronzing of the hands and feet, face, &c. is common in lepers, where anæsthesia and

tubercles exist; this fact may have given rise to the term "black leprosy," the worst form of the disease; the Hindoos have besides a white leprosy, which is probably Baras. In the Mosaic, Arabic, and Greek authors, we also find the terms white and black in constant use.

2. Anæsthetic Leprosy.

Impairment or loss of the tactile sense is the prominent character of this phase of leprosy, and, in the earlier stages, the first symptom noticed: it is moreover a very common attendant on the two other phases, as in one has already been shown, and as subsequently will appear in tubercular leprosy; it is therefore the most constant feature of the disease, at least in India, and the most significant. Inability to appreciate differences of temperature and other kinds of irritation, forms part of this symptom; but the muscular sense is impaired, if at all, only when paralysis (acinesis) comes on, and that is neither invariable nor marked even in advanced cases.* The explanation of this fact indicates the special seat of disease, viz., the cutaneous nerves proper in their course above the deep fascia; or else the nerve-trunks of compound function where they approach nearest the surface, and then probably only the sensitive or cutaneous element, as will appear further on. Conjoining to this striking peculiarity the circumstance of the two other phases of leprosy being skin-affections, it might be inferred that the proper seat of the disease is the cutaneous system, and to this conclusion my own observations seem to point, but therein they differ materially from M. M. Danielssen and Boeck's. Viewed as the evidence and result of a diathetic condition

* I have been fortunate enough to meet with a most interesting account of a "case of anæsthesia" by the well-known Physician, Dr. J. Yelloly; it is published in the Medico-Chirurgical Transactions of London, vol. III., p. 90, and is really an example of anæsthetic leprosy, although not recognised as such. The observant author clearly points out the peculiarity I now refer to, but being unacquainted with the morbid anatomy of leprosy, he was naturally at some loss to explain the symptoms. Dr. Yelloly's paper is worthy of close perusal by those interested in this subject, and I am glad to refer to it as confirming in so many ways my independent observations.

(which undoubtedly is present in leprosy), anæsthesia of this kind, so far as I know, occurs in no other disease to which the human frame is liable: but it is not my intention to enter upon the subject of the pathology of leprosy, which must yet be a matter of speculation; I have only to record, as accurately as possible, the results of direct observation of its symptoms and morbid anatomical characters.

It will be convenient to introduce here some statistical facts connected with the biology, &c. of the disease in general, and so to avoid needless repetition.

General Remarks on Leprosy.

1. *Comparative frequency of its different varieties.*—The following table contains a brief summary of the cases I have noted: in distinguishing the various forms it should be recollected that they all belong to one disease and consequently often blend:—

	Dispensary patients.	Dhurumsala patients.	Hospital fatal cases.	Total.
Anæsthetic Leprosy	29	29	9	67
Mixed Leprosy (anæsthetic & tubercular) ..	5	28	7	40
Tubercular Leprosy	2	14	1	17
Baras	5	9	0	14
Anæsthetic Leprosy and Baras	22	26	0	48
Total..	63	106	17	186*

Such according to an arbitrary arrangement was the condition of the patients at the time of being first seen; sometimes the disease was advanced, sometimes only commencing, and on the more predominant symptoms alone were these distinctions made. Each of the varieties above distinguished might claim separate

* Notes of 17 other cases now before me were unfortunately mislaid before this table was drawn up; they would only serve however to confirm the results it points to. One was fatal, the patient being a Portuguese female suffering from anæsthetic leprosy and finally anasarca, &c.

notice, and would repay it, did space permit. I may mention that no evidence has come before me indicating that Leprosy is less frequent than formerly.

2. *Age at which the disease commenced.*—Of 65 cases of anæsthetic leprosy the symptoms first appeared under 30 years, in just over half the number; in many under 20 years, two cases being under 10 years: in comparatively few after 40 years. The eruption made its appearance rather more frequently under the age of 20, and so the combined form of it and anæsthetic leprosy: the same seems to hold good of the tubercular variety.

3. *Sex.*—Males suffer much more frequently than females from the first form; the same is the case with the tubercular; not so with baras, as it would appear, but the data are limited.

4. With regard to *occupation*, many patients are fishermen, many ryots, or field-labourers; amongst the Dispensary patients were men engaged in very various trades. All live more or less on rice and dried, or salt, fish.* I may here mention that Elephantiasis is also popularly attributed to a fish diet, and is commonest along the sea-board, in this Presidency: I have never seen a union of the two diseases.

5. The *localities* where lepers have resided or been born, are usually Bombay and the neighbouring fishing towns and hamlets, the names of these are in my notes, but need not be introduced here. As before mentioned, the disease is common in inland parts; for instance in the Huttee Sing and Premabhai hospital at Ahmedabad, there were admitted in 1861, 72 cases of leprosy, 50 being marked as anæsthetic and 22 as tubercular; but, as Surgeon Wyllie, in charge, observes, "in some the distinction was ill-defined, and in several both conditions appeared co-existent:" he also states that the disease is not so common as might seem near Ahmedabad, for "in most instances the patients have come from distant provinces, notably Rajpootana and Katiawar": several were re-admissions: three deaths

* See the note at page 2.

occurred during the year. I hope that the present imperfect account of leprosy will be the means of eliciting useful if not important information concerning this sad scourge, by drawing attention to some of the points now referred to.

6. The *duration* of the disease may, when not extensive, be prolonged to upwards of 30 years, the patient retaining a fair amount of health and vigour; it is generally much less, 5, 10, or 15 years being, perhaps, the usual periods, but there is not, to my knowledge, either a uniform termination, or limited course: much will depend upon the outward circumstances of the patient.

7. *Cause of death.*—I am not able to point out any special cause of death in leprosy, attendant or accidental complications having generally carried off the patient: thus in 17 cases, four died of cholera, a larger number of debility induced by chronic diarrhœa or dysentery, and this is probably the most frequent mode of termination. Two patients, however, died from albuminuria: fever and anasarca were present in one of these, the leprosy being of the anæsthetic kind and of three years' duration (see M.L. TABLE (1) no. 2); the other was complicated with acute jaundice, the leprosy was mixed, and of only one year's standing (see M.L. TABLE (1) no. 3): both were Portuguese.* As in six other cases at least, the kidnies were found more or less diseased after death, it may be presumed that interference with the functions of these organs assists in hastening a fatal issue. It should be stated that in one of the above Portuguese patients inflammation and suppuration of the absorbents in the axilla were present, and in two other cases, unmistakeable phlebitis was found in connection with sloughing and ulceration of the extremities, the kidnies being also diseased: in one of these two abscess of the liver and dysentery had occurred, but the second patient complained only of fever and debility, and it is possible death may have been owing to pyæmia: such a conclusion would

* A third case is that of the Portuguese woman mentioned in a previous note, she died of anasarca, &c., having been affected with anæsthetic leprosy for seven years.

not be warranted in the other cases, yet the presence of pus in the absorbent and venous systems is a fact which should not be overlooked.

Further remarks will be made under the head of Morbid Anatomy.

An acute form of tubercular leprosy has been distinguished by the Norwegian authors; I am not acquainted with it.

8. *Hereditary predisposition.*—This is undoubted: amongst the Dhurumsala patients it was frequently noted, 41 times out of 107, a few of the latter being uncertain; in 24 instances it seemed to arise on the male side, in 17 on the female, and transmission of the taint did not always occur in a direct manner, but sometimes by alternate generations: often its presence was indicated by disease in the brother or sister of either of the parents. Out of 24 cases of anæsthetic leprosy, 9 acknowledged the existence of a taint; and in a similar number of the same combined with baras, not fewer than 14. Amongst the Dispensary patients this predisposing cause was less evident, or rather less frequently acknowledged, for there is natural unwillingness to admit that such a terrible and loathsome malady has ever occurred in a family. The subject is worthy of fuller inquiry than I can now attempt, although my notes are sufficiently copious.* It has been already stated that a *syphilitic* taint does not appear to be essentially connected with leprosy, but, as is well known, this is a subject of debate amongst physicians in Europe, especially in Germany.

9. *Contagion.*—The disease is not communicated by contact, or through the air; whether it be inoculable, may be questioned

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* The following illustration of the general belief in hereditary tendency was mentioned to me by my friend H. J. Carter, Esq., F.R.S., as happening in his experience. A Sheik on the Arabian coast owed something of his distinction to the circumstance of his being affected with anæsthetic leprosy, for his tribe pretended to recognize the rightful successor to power by the appearance, after a certain age, in his person, of the peculiar distortion of the hands; in saluting him they were in the habit of kissing the elbow instead of the hands, as usual.

At the Dhurumsala in Bombay, we might expect to find some evidence of contagion, if anywhere, for the lepers mix freely with the people in the immediate neighbourhood; yet on inquiry no instance of propagation of the disease was ascertained. The following statements however are worth noticing: a late sepoy in charge of the Dhurumsala had two children affected with leprosy, both of whom died about the age of puberty; they were in the habit of running about amongst the inmates: neither of the parents was affected. Some years after marriage and birth of healthy children, a wife became a leper and afterwards her husband, the form of the disease being different in each; neither acknowledged an hereditary taint. Again, the wife showed symptoms of leprosy (tubercular) soon after marriage with a leper (similarly affected), the children are yet healthy, though grown up: and in a third case, the husband being a leper, the wife became so, and their son is affected. In all these three last instances the patients were natives of localities where the disease is common, hence no satisfactory inference can be made. Another supposed feature of leprosy may be here noticed—the *libido inexplebilis*—evidence of which was apparently presented in two or three cases of intermarriage, other inducement being at least hardly conceivable.

Anæsthetic Leprosy.

Its symptoms readily arrange themselves into three groups, answering to the early, established, and terminal stages, and in this order will be now referred to; each category being illustrated by cases taken from my notes.

Premonitory and early stages.—If there be any symptoms which are strictly premonitory, I have never seen them, but such are mentioned by experienced writers; their descriptions, however, have generally seemed to me to be based not so much on direct observation, as upon inference or a supposed analogy of leprosy to the eruptive skin-diseases: I cannot regard this view as correct. Some of the ancient Greeks remarked that the disease is not detected until it has already made its appearance by unmistakeable signs; and such is my own opinion, but it is

given with diffidence, being the result of a somewhat scanty experience.

Of the disease at an early stage, I have seen several instances. It has been stated by some that hyperæsthesia is a common attendant at this period, but my experience does not accord with theirs; in anæsthetic leprosy this symptom has certainly been absent if we may trust the asservations of the patients themselves, and in the earliest cases I have personally examined, it has been wanting. I have, however, seen considerable tenderness in parts of the face where a puffy, flushed appearance seemed to indicate the onset of tubercular thickening, and I have been informed of an instance where it was present in the lobules of the ears which are supplied by a nerve very often found diseased. Tenderness has also a few times been found in the hands, &c., when the cuticle overlying the digital nerves was much thinned, but these cases are rare and of some standing; and they strictly belong to the form of leprosy here termed 'baras.' Local sensations of pricking, shooting, burning pain are often present in the fingers, toes, &c.; sometimes there is a susceptibility to cold, and a feeling of heaviness and weakness, with tremor, in the part. Similar sensations running upwards in the course of the great nerve-trunks of the extremities as far as the elbow or knee are frequently felt, being either spontaneous or excited by slight pressure, &c.; if local tenderness co-exist it is greatest at certain points, as on the side of the neck (n. auricularis magnus) above the middle of the wrist or bend of elbow (median nerve); or behind and above the inner condyle, and at inner side of wrist (ulnar nerve); behind the inner ankle (posterior tibial n.) or along the inner side of the leg (long saphenous n.); sometimes a distinct enlargement of the nerve is perceptible to the touch in these places. These local symptoms are often increased at night. General aching wearing pains in the limbs, &c. are occasionally complained of, and I have also noticed an excited state of the system, with tremulous movements of the extremities, but this appeared to be rather the result of depressing emotions, &c. Fever is not a special attendant on leprosy, but will cause

exacerbation of the symptoms for the time; nothing like the so-called "elephantoid fever" has come before my notice in Bombay. Many patients have expressed themselves not so well in the cold season as at other periods of the year.

The following cases are intended to illustrate these remarks, in some the disease is first appearing, in others a fresh part is being attacked: as a matter of convenience the upper extremity has been selected for illustration.

Case 1.—Anæsthesia of ten days' standing, dorsum of hands and feet affected. A Parsee, ætat. 30, a carpenter, living in Bombay. On the dorsal aspect of all the fingers and thumb, also on the back of the feet, near the ankle, is well-marked numbness of the skin (the first symptom noticed by the patient) with a coarse dry wrinkled appearance, but no change of colour beyond a slight reddening: over all these places the cuticle comes off in thin flakes; there is no kind of local irritation, or unusual sensation, and no impairment of muscular power. In the hands the numbness is greatest over the knuckles and does not extend so far as the ends of the fingers, a circumstance readily explained by the anatomical distribution of the radial and ulnar (dorsal branch) nerves on the back of the hand. There is no general disturbance of the system, or fever; no hereditary predisposition or any apparent cause for these symptoms: health good. (Dispensary patient, No. 44.)

Case 2.—Anæsthesia of one month's standing—the median nerve affected. A Mussulman farmer, ætat. 42, from Broach. There is numbness without marked alteration in appearance of the tips of the thumb and two next fingers, on their palmar surface (right hand); when they are irritated, pain is felt along the middle of the forearm as far as the elbow, in the track of the median nerve, and the same effect follows jarring of the elbow or irritation of other parts supplied by the median nerve: there is no local tenderness in the course of the latter, but at night flexion of the forearm causes such uneasiness as to interfere with sleep. The tips of the fingers have not their temperature altered. For upwards of a year the middle cutaneous nerves of both thighs have been affected; the anæsthesia began near the knees. There is no hereditary taint, but he has had syphilis: health good. (Dispensary patient, No. 41.)

Case 3.—Anæsthesia of the hands of a month's duration—both surfaces affected. A Hindoo, ætat. 26, a carpenter, native of Bombay. About a month ago when lifting a carpet bag he experienced a feeling of numbness in the hands, extending up the forearm, similar to that caused by pressure at the elbow (several other patients have used the same simile, some compare the feeling to the creeping of ants): since that time the numbness has increased

and extended to all the fingers. He positively asserts there was no previous exalted sensibility in the hands, and at present no tenderness in the course of the nerve-trunks can be detected. Left hand—outer part of palm (median nerve) and dorsum (radial nerve), including the thumb and corresponding fingers, are quite benumbed, and a slight though perceptible change of appearance is already visible, the palm and fingers having a purplish hue and looking smooth and dry, but not yet shrunken : muscular power intact. Right hand—is in a similar state, only sensation partly remains in the ball of the thumb, &c. : small blisters, accidentally caused, have appeared on the outer side of the fore finger. The legs and feet have long been benumbed (two years) : on the left side everywhere below the knee, the skin being shrunken and bronzed, and scars of sores are seen in the sole where pressure is greatest ; there are no bullæ : on the right side the extent of anæsthesia corresponds to the distribution of the external saphenous nerve, and the skin is here, too, dry, bronzed and shrivelled. He denies hereditary taint and syphilis : is in fair health. (Dispensary patient, No. 80.)

Case 4.—Incipient anæsthetic leprosy. A Mussulman, ætat. 35, a drum-beater, native of Mahim, near Bombay. Symptoms of five weeks' standing. There is considerable numbness of both surfaces of the hands and fingers, limited above at the wrist : the skin of the palm is dry and shrunk and the cuticle is here desquamating in thin flakes ; temperature not perceptibly changed : the dorsum of the feet, including the lower and inner part of the leg, in front, and the soles especially, are also benumbed ; the skin is affected in a similar way to the hands. Muscular power and muscular sense (?) are so much implicated that he can hardly stand on his feet or feed himself : the movements are tremulous and slow. No tenderness of the nerve trunks, or other marks of leprosy : no premonitory symptoms, or local sensations except debility, twitching, and aching pains. Is in poor health and of intemperate habits : formerly suffered from syphilis : denies an hereditary taint. (Dispensary patient, No. 85.)

The local sensations are frequently so slight as to pass unnoticed by the patient, the numbness being then the first symptom observed, and this is often discovered by mere accident, *e. g.*, the fingers or toes are not uncommonly scorched unawares ; one man found he could not feel the bridle he was holding, &c.

There is no computing indeed how long absent or deficient sensibility may remain unobserved, for it is well known that persons who are deaf, or devoid of the sense of smell, may be unaware of the fact during the greater part of their lives.

It will be remarked that the pricking, creeping sensations and the attendant anæsthesia commence at the peripheral terminations of the affected nerves, extending *centrad*, and that the local tenderness and swelling of the latter, if present, are generally noticed simultaneously: the chronology of these symptoms is of some interest, but unfortunately the data are not always to be relied on. A case which I carefully examined, presented an apparent exception to one of the above statements, for while the palm of the hand (except the inner side) was benumbed, the tips of the thumb and three inner fingers were still sensitive to the prick of a pin: I could not be sure of any difference between them and the tips of the opposite fingers, which were benumbed, though otherwise hardly changed.

The foregoing instances will also serve to show the earliest changes the benumbed skin undergoes; these are briefly a dry, flushed, shrunken, mummified appearance, the cuticle being evidently atrophied, and smooth though shrivelled; it occasionally shows a tendency to desquamate. In dark skins a bronzed tint is very common. There is no evidence of elevation of temperature, but rather a tendency to the reverse. Perspiration is generally deficient or absent on the benumbed surface, and sometimes over a large extent around. Except the bronze tint which is less common there, the skin of the palm shows these changes best.

The following cases further illustrate these, and the next succeeding phenomena, one of which is the appearance of bullæ or vesicles. The hand is taken for example as before. Nos. 9 and 10 are of special interest as proving a close relation between local nerve-affection and the superjacent eruption (Baras), the specific character of the latter being thus again demonstrated.

Case 5.—Symptoms of a month's duration, or longer—tenderness in nerve-trunks considerable—further local changes. A Hindoo, ætat. 45, a trader, native of Bombay. Anæsthesia appeared on the palmar aspect of fourth finger left hand, spread to dorsum and also to the little and middle fingers; a slight degree of numbness is present in the inner margin of the palm, which already is a little concave, indicating some degree of atrophy: the little finger has lost its flexibility and the fourth is swollen, stiff, and

superficially ulcerated. Since 15 or 20 days there have been pricking and shooting pains in the forearm and inner side of arm: there is also decided tenderness at the middle of the forearm above the wrist and the front of the elbow, but especially behind the inner condyle, also along the course of the median and ulnar nerves in the arm as far as the armpit, firm and tender cords are felt in the position of these nerves. The pain is so great when the arm is bent or compressed that he cannot sleep. There is no tenderness over the spinal column in the neck. He had syphilis many years since: no known hereditary tendency: no other part affected: there were no premonitory symptoms whatever. He has long suffered from dysentery, and is thin, but tolerably strong and very intelligent. Afterwards it is noted that perspiration is scanty in the left arm (this symptom has been found in other cases), and that the skin of the hand is becoming darkened and shrunk. (Dispensary patient, No. 47.)

Case 6.—Disease of the ulnar nerve of 3 months' standing—marked diminution of temperature. A Mussulman, ætat. 25, from Hindoostan. Above the inner condyle of the left arm is an elongated swelling, visible even to the eye and tender to touch; pain and tenderness extend also as far as the axilla; pressure on the swelling causes shooting pain and spasms in the two inner fingers of the hand. Here is seen slight atrophy of the inner side of the palm, slight flexion of the two fingers, with some thickening of the ring finger; on the dorsal surface is a light-reddish patch, probably the result of a caustic application intended to remove the numbness there. The skin of the palm—inner half—presents a slight blushing tint and shrivelling, extending to the fingers, the innermost of which seems a little atrophied: these parts are of a decidedly lower temperature than the rest of the hand, judging by the feel only: they are completely benumbed. The whole hand is weak, the interosseous spaces collapsed, particularly the first one (the adductor pollicis muscle supplied by the ulnar nerve being paralysed), and the thumb is much weakened. There is decided atrophy of the inner side of the fore arm: the hand is displaced somewhat outwards as if the flexor carpi radialis muscle were acting without an antagonist. History—there was first a pricking sensation (as if asleep) in the little finger, followed by numbness in it and the next finger; soon afterwards the swelling at the elbow attracted attention, there being great pain and tenderness shooting along the forearm, which prevented his sleeping; increased numbness and weakness followed, but the symptoms now progress very slowly. Is in fair health and intelligent; denies syphilitic and hereditary taint. (Dispensary patient, No. 471.)

Case 7.—Disease of the ulnar nerve. An adult Parsee, who for a year and a half has shown symptoms very similar to the last case: the skin at the inner side of the palm (right hand) is thinned, red, and shrunk, the change being very apparent indeed; there is twitching of the small muscles supplied

by the ulnar nerve: on the latter just above the elbow is an elongated tender swelling. The hand is very susceptible to cold, and the temperature, at the inner side, is slightly reduced, judging by the feel. This patient formerly attended the Dispensary, but the disease was not then detected, being mistaken probably for inflammation of the lymphatic glands at the elbow, but the hand was already implicated, for poultices, he states, were ordered: there is no clear evidence, however, of hyperæsthesia now, or in the history. (Dispensary patient, No. 70.)

Case 8.—Anæsthesia of a year's standing: bullæ, or vesicles. A Mussulman, ætat. 45, from Baroda. There is numbness of the dorsum of both feet and both hands; and slightly of the lobules of both ears, which are rather reddened. In the hands the tint seems darkened; the anæsthesia is limited precisely to the dorsum, and does not extend to the ends of the fingers (this part being supplied by a branch from the palmar digital nerves.) The feet are much bronzed, particularly the left one where the disease began, and numerous small bullæ or vesicles appear on the sides and tips of the toes, he states, in a perfectly spontaneous manner: the size of some is almost minute. The anterior tibial nerve is probably less affected than the musculo-cutaneous: the sole of the left foot is benumbed, and there is tenderness behind the inner ankle. He never had syphilis and knows of no hereditary taint. (Dispensary patient, No. 77.)

The case of Tah Mohammed narrated at page 6, is also an excellent illustration of the early stage of anæsthetic leprosy: see as well that at page 14.

Case 9.—Identity of seat of the eruption and the nerve affection. An adult Mussulman, from Rutnagherry (coast), complains of numbness of the right arm and forearm over the extent supplied by the two internal cutaneous nerves, also of the palm of the hand and little finger where supplied by the ulnar: this he first discovered by accident about a month since. Around the elbow and above, the skin has a pale appearance limited by an indistinct but defined margin, which is gradually spreading upward: here the anæsthesia also ends and pressure at this spot, over the ulnar nerve, alone causes shooting pain in the course of the latter. Other pale patches are found at the knees, of longer standing. (Dispensary patient, No. 82.)

Case 10.—Baras attendant on the local anæsthesia and disease of ulnar nerve. Nowrojee, ætat. 15, a carpenter, living in Bombay, in good health, but unable to work on account of the left hand being weak or tremulous, and stiff. There is already atrophy of the palm, and the appearances so characteristic of leprosy have begun to show themselves: the skin near the wrist, on the inner side, is shrunk, dry, and dusk, and quite benumbed. On the inner, front, and outer surfaces of the forearm up to beyond the elbow are two large

patches of baras of a perfectly typical character and most striking to the eye: they are quite benumbed. The ulnar nerve at and above the elbow is greatly enlarged and very tender; pressure on it, as he observes, causes twitching and shooting pains running downwards to the inner fingers. The dorsum of the hand is not benumbed except over the little finger, and here there is the pale red tint generally indicating the eruption, indeed it is evident that the large patches of baras began at this spot upon the benumbed surface and they have spread upwards over the course of the internal and external cutaneous nerves. The history of the case shows that pricking pains and numbness were first noticed in the hand (and this only two months since), about the same time pain and tenderness at the elbow, and a short time afterwards (three or four weeks) the eruption made its appearance, at first on the dorsum of the inner finger. Great weakness and atrophy of the hand followed with quick spreading of the eruption upwards: no fever. (Dispensary patient, No. 83.)

These two cases, and I could mention others, offer conclusive evidence of the close but inexplicable relation of disease of superficial or cutaneous nerves with a characteristic form of skin disease. The last one is remarkable for the rapid progress of the local symptoms, depending upon extensive and acute nerve-disease.

Thus it will be seen that wasting of the deeper seated tissues and of the muscles supplied by the diseased nerves, with atrophy, flexion, and stiffness of the fingers and toes; frequently a marked diminution of temperature; vesicles and superficial ulceration, are the chief phenomena which succeed the anæsthesia. The distortion of the hands is peculiar, the palm being narrowed and concave, the first phalanges drawn backwards, the two next, flexed stiff and claw-like, are also much wasted. The ball of the thumb subsides, and a marked depression exists where the first interosseous muscle should be; and as might be anticipated, muscular power of the hand is diminished, but it is not lost until the muscles themselves have probably become wholly changed; in the forearm, paralysis seldom occurs, and then on the inner side where the two muscles supplied by the ulnar nerve are placed; I have also noticed a wasting here, indicated by a straight or concave outline. All these changes may occur in a few months, or they may be delayed

for two, three, or more years, depending, no doubt, upon the degree of nerve disease, and also the general condition of the patient. The bodily health is not yet necessarily affected; patients in favourable circumstances still retaining their vigour, with the exception of this curious blight in one or other of their limbs.

The disease has now reached a *confirmed stage.* The function of certain parts is seriously affected by impairment of their nutrition. As bullæ continue to appear they may be noticed first: their most frequent seat is the fingers and hand, toes and feet, but I have seen them on the thigh, nates, &c., never on the face: their size varies from a line to an inch in diameter; their number is small, one or two appearing at a time, generally in the night, and their form is irregular: they contain a turbid or reddish fluid, and sometimes are but little raised, as if the effusion were seated in the cutis itself: they usually subside in two or three days, but may burst, leaving a raw surface which, however, by no means invariably ulcerates; finally a white spot may remain if the cutis have been involved, otherwise no distinct mark may be left. I have once or twice seen a deep ulcer leading to bone (beneath the ball of the great toe) and around which the skin was benumbed, said by the patients to have begun by a vesicle. Difficult as it may be to explain the occurrence of these bullæ on benumbed surfaces, it cannot be denied that many times they appear to arise spontaneously, and hence they have been ranked as the peculiar feature of anæsthetic leprosy; but it is equally certain that they are often absent, and in my experience they have never appeared on a surface not previously anæsthetic, so that their diagnostic value can be but slight. And again, they may often be traced to an accidental cause, as the heat of a fire, or "biri," friction of the shoes, pressure, or some such slight irritation (unperceived by the individual), as it is probable would induce their formation on a surface the vitality of which is depressed, and cutis partially disorganised: they occur, too, on parts most exposed to such irritation, as the knuckles, sides and tips of fingers, sole of foot, &c., and finally in appearance there is nothing to distinguish them from other

accidental vesicles, only sometimes they seem deeper placed. Febrile symptoms neither precede nor accompany their appearance.

It may be observed that sub-cutaneous structures, *e. g.*, the bottom of a deep sore, will be sensitive when the cutaneous surface around is benumbed; this I have noticed more than once, and it seems to show that the anæsthesia is, sometimes at least, only superficial. Ulcers generally readily heal.

The frequency of an accompanying eruption (baras in one of its forms) has been fully pointed out and illustrated in previous cases; when present it was found to have preceded the anæsthesia rather oftener than follow it, the interval being generally a year or two. In many instances of long standing leprosy it had ceased to be visible, if the statements of patients are to be trusted, and as anæsthesia would probably remain, this may be the explanation of the extensive benumbed but otherwise unchanged surface sometimes noticed on the trunk: it must be acknowledged, however, that the cause of this wide-spread anæsthesia has not been adequately investigated, and it is probable that the cutaneous nerves are also sometimes implicated, as on the extremities, since the numbness may be wanting in defined regions, as for instance, along the median lines of the trunk, and here alone, or on the front of the abdomen, &c.: the intercosto-humeral nerve is not seldom diseased. Bronzing of the skin of the feet, hands, and face, is common in dark Hindoos and Indo-Europeans; it may be partly due to exposure, but is accompanied by atrophy and smoothness, as well as deficient sensation.

The progressive interstitial absorption, the most frequent and characteristic mode by which the hands and feet become distorted and partly destroyed, always commences at the ends of the fingers and toes (like the anæsthesia), and it would seem that the terminal phalangeal bone is very early affected. After its removal the altered nail and pulp are transferred by a kind of involution as it were, to the second segment of the digit, subsequently to the first, which also not unfrequently

disappears, and so destruction proceeds. Striking limitations of this process to one side or its greater progress there are sometimes seen, corresponding evidently to deeper implication of the median or ulnar nerves, or in the foot the inner and outer plantar: my notes refer to remarkable instances in the latter locality: this fact will be again referred to as proof of the real though obscure dependance of nutrition upon nerve influence. In spare subjects the fingers become very slender by absorption, but in the plethoric Mussalman or lymphatic Parsee this may be less evident; they are then shortened, and being thinnest opposite the intervals of the joints, the latter appear swollen, or become so from chronic inflammation. It is in these cases, I believe, that the Pacinian corpuscles will oftenest be found changed; they are seldom so in the dried and shrivelled hand. Necrosis of the phalanges is not uncommon; it begins at or near the joints which then become swollen, foul ulcers appear on their dorsal surface, and fragments of bone, or a whole phalanx, are extruded there: but this process, infinitely more unsightly though not more destructive than the first described, is not so prevalent as supposed; the two may co-exist. In either case the hand or foot is mutilated, nay, well nigh destroyed; in the worst examples it is doubtful if even the carpal bones remain, and a good part of the tarsus may be removed by the same interstitial absorption, accompanied with no pain, swelling, or sores. It is not then without reason that this variety of leprosy has been named "articular," or sometimes the "joint evil;" although the large joints are never attacked. I notice that the nails are less frequently deformed than in tubercular leprosy.

The occurrence of ulcers, sometimes large, deep, and foul, and of local gangrene, may be referred to a combination of accidental causes and deficient nervous influence, aided by exposure and want: that the second of these causes may alone lead to ulceration seems shown by its presence on the lobules of benumbed ears, parts little liable to direct irritation. Absorption of the nasal bones is often seen in advanced cases; it may possibly be

connected with disease of the nasal branch of the fifth cranial nerve. In accordance with its constitutional nature advancing leprosy generally attacks symmetrical parts, both hands and both feet, but less often, I think, both sides of the face: striking exceptions however occur, I have twice seen a unilateral affection of the extremities, of the right and left sides respectively. The comparative extent to which the two extremities are usually implicated—the lower the greater—is partly explicable on anatomical grounds: but it is worth notice that men engaged in manual labour are frequent subjects of numbness and distortion of the hands, particularly carpenters; and we may suppose that the exposure, &c. the feet are ordinarily subject to, certainly accelerates, may perhaps dispose to, the disease there.

That a cachectic condition of the system is likely to supervene under the circumstances in which most lepers are placed, might be presumed: it may even be concluded that a leprous taint naturally leads to such a condition, for there is certainly a deteriorating influence at work in the system, and if its effects may be somewhat hastened or deferred, this may be owing to the fact of the textures involved being here more than elsewhere exposed to sources of injury, or capable of adequate protection. General growth and development are not so stunted as in the tubercular form of the disease, but patients are seldom attacked before the age of puberty. I am inclined to attribute to a 'taint' of the latter form the occasional great distortion of the hands, &c., when evidence of nerve-disease seems slight, not that the symptom of mere numbness can be viewed as a perfect measure of the latter, although it is the readiest means of detecting its presence; there are however other components of nerves besides sensory and motor nerve-tubules, which preside over the vascular and calorific processes and are derived from the sympathetic system; it is not improbable that these elements may be most of all liable to leprous nerve-disease.

The cases that follow will supply deficiencies in these cursory remarks, and also give a more general view of the leprous state

by exhibiting its assembled characters: they have been selected for this purpose.

Case 11.—Anæsthetic leprosy of 8 or 9 years' duration. A male Hindoo, ætat. 25, a ryot living near Panwell (coast). Of moderate habits: never had syphilis. Numbness was first noticed on the calf of the left leg, no premonitory symptoms, or fever, that he recollects: recently sores have appeared at this part and elsewhere. General condition fair; not emaciated or stunted in growth: appetite good: bowels not costive: pulse 66, soft: is tolerably intelligent. No affection of the viscera of the chest or abdomen. On the face, the tip of the nose, the cheek, and the ear, are benumbed (for the last two or three years), the skin is but little changed, looking only a little coarser than usual: throat unaffected. On the trunk is nothing abnormal. Upper extremities—from the shoulder downwards is numbness everywhere, except on the front of the left forearm, and arm: the anterior and inner surface of the arms and forearms are of a rather lighter colour than the rest, but this is probably not unnatural: the hands are not much affected, but the interosseous spaces and fingers are atrophied, and the skin shrivelled: two fingers are bent and fixed in one hand. Lower extremities—from the hip downwards, anæsthesia is present everywhere without exception: little apparent change has occurred in appearance, &c., but within the last six months some of the toes of the right foot have disappeared; others are swollen, smooth, but not shortened. There is no apparent complication. No hereditary taint that he knows of. (Dhurumsala patient, No. 10.)

Case 12.—Leprosy of 16 years' duration. A Mussulman, ætat. 35, a porter, from Bancote (coast). Vesicles first appeared on the hands, and numbness was discovered at the same time and has spread up the arm: the feet then became affected with numbness and distortion, but no bullæ appeared on them: and there seems to have been some pale discolourations of the skin soon after the numbness. There is no distortion of the face, which is well covered with hair, but there is anæsthesia of the forehead, cheeks, and chin, but not on the lips. Nothing abnormal in the throat. There is numbness of the skin of the back and front of the body, except along the middle line and sides of the abdomen: no discolouration, &c. is at present visible, but pale patches formerly existed. The skin of the entire upper extremities is very considerably benumbed, without any apparent change: the hands are greatly distorted, most of the fingers shortened and of some only the stumps remain, bent and stiff: some superficial sores are seen. The same is the case with the lower extremities, entire numbness from the hips downwards: the toes are very much distorted; on the left foot the great toe is gone, and others atrophied, &c.: on the right foot, some of the smaller toes have almost disappeared, the great toe is much distorted. General bodily condition fair: is intelligent. His father's relations for four generations back have been

healthy, his mother is well, but her brother was affected with leprosy: his sister is well: has no children. (Dhurumsala patient, No. 58.)

Case 13.—Distortion of the hands, with little loss of feeling. A Hindoo, ætat. 25, a ryot, from near Panwell; the disease is of 7 or 8 years' standing. First of all there were pale discolourations of the skin which spread widely: at present, is some thickening of the skin of the face, nose, and ears, but sensation is little affected: the hairs remain; on the body are the slightest possible traces of light-coloured patches. Upper extremities—there is atrophy of the hands, the fingers have become smooth, rounded, and whitish in colour; their terminal phalanges have disappeared, the nails remaining as a misshapen mass: he declares he feels readily the prick of a pin in all parts. Lower extremities—from the middle of the legs downwards is perfect loss of sensation in every part, and yet beyond a slight bronze tint, there is nothing abnormal to be seen, the toes being hardly affected at all. Is in fair bodily condition. His father and mother are both living (the latter has since died in the Dhurumsala); both were affected with leprosy in precisely the same way as himself; but a younger brother and sister are yet well: he is betrothed to a leper in the Dhurumsala. (No. 44.) No. 85 of my notes is a similar case to this; with much distortion of the hands, and destruction of the fingers is hardly any impairment of sensation; while the legs are affected in the usual way. In these cases we must suppose only the median and ulnar (main trunk) nerves are affected and not the cutaneous nerves, or dorsal branch of the latter: the large trunks in the lower extremities are differently situated with regard to the cutaneous supply of the feet. It is my impression, however, that they and like instances which appear at first sight exceptional, in the absence of marked or wide cutaneous numbness, belong to the group intermediate between the two chief forms of the disease, a 'tubercular' taint so to speak being present and serving to account for the disproportionate degree of local change. Such is also the following:—

Case 14.—Great distortion of the hands and feet—anæsthesia incomplete—leprosy of 35 years' standing. A Hindoo clerk, ætat. 51, native of Bombay, and in comfortable circumstances. Below the wrists and middle of the legs, such a degree of numbness is present, that he does not feel firm pinching of the skin, or the presence of heat, but the sharp prick of a pin is felt. The fingers are shortened, a little thickened, bent, and stiff; interstitial absorption began at the terminal phalanges: the deep-seated structures disappear, the skin and nails persist and follow in a retrograde direction the diminishing digit: no sores occur during this process. The feet are more affected than the hands, and there is a sore on the left sole. There seems to have been some thickening of the skin of the face and certain spots on the body, traces of which are not now apparent: bullæ appeared formerly on the fingers and toes. No perceptible enlargement of the ulnar nerves at the elbow. He

is intelligent and enjoys tolerable health, but there is a drooping of the lower eye-lid and a discoloured conjunctiva which would indicate persistent cachexia: he has been treated with mercury and thinks with benefit. His elder brother was affected in a very similar way to himself. (Dispensary patient, No. 58.) A young man was attending the Dispensary at the same time whose hands and feet were in a precisely like condition, but the anæsthesia was more extensive and all the changes had occurred in the course of three years—a great contrast to the above.

Advanced and terminal stages.—These by help of the fatal cases in Table (I) and some of the above, may be as readily conceived as described. Anæsthetic leprosy is less exhausting in its course than the tubercular: there is seldom the prolonged drain of suppurations, a less extent of the body is implicated, and the blighting influence upon growth and general nutrition has not been so marked.

It is unnecessary to again depict the poor crippled leper—an outcast, yet clinging to life—his sufferings susceptible of much amelioration, but exposure and want of mere necessaries his too common lot—more than helpless, a very repulsive object, which charity almost loathes to approach. The mental faculties are not directly impaired, the organic functions might be fairly performed and appetite restored, but failing the means, a natural mode of relief does not long delay its appearance and its work.

3. Tubercular Leprosy *alone or combined with the Anæsthetic* (Mixed Leprosy).

About 15 per cent. of the cases I have noted presented the combined characters of tubercular and anæsthetic leprosy; this may be called the "mixed" variety. Signs of the former were visible on the face, of the latter in the extremities, and in both localities of the characters usual in unmixed examples: it must be added, too, that almost all these cases are either accompanied by a distinct eruption, or began with such; so that the distinction of this variety, as of the others, is founded only upon the characters which predominate.

Mixed Leprosy.

Decided indications of the nerve affection accompany the manifest distortion of the features, and in about a fourth part of the whole are traces of an eruption on the trunk and limbs. The first-named symptoms co-exist with the usual distortion of the extremities: the nails, however, are sometimes converted into mere horny clumps, and the bronze tint is often deep. Tubercular thickening, usually well marked, sometimes seems, as it were, mitigated; and numbness of the altered skin is invariably present on the face, &c., hence it may be presumed that disease of the branches of the fifth cranial nerve is more common than in simple tubercular leprosy. The eruption is present as pale discolourations, having roughened surfaces, frequently benumbed.

In one-third of the cases, the disease appeared under 20 years of age; in nearly as many under 30, seldom as late as 40. When commencing early it greatly checks the growth of the body; two or three patients were lamentable examples of ill-developed humanity. Its duration may extend to upwards of 25 years. The evidence of hereditary transmission is very decided, often on the mother's side. About one-third of the whole were females, a proportion above the average in leprosy generally. A syphilitic taint is uncommon. It so happens that one-half of the fatal cases I have seen were referrible to this variety of the disease, and to the summary of them in TABLE (I) I may refer for further illustration of the mixed form of leprosy.

Tubercular Leprosy.

This form of the disease was most marked in about only 8 per cent. of the cases noted by me, and although its separation from the mixed form is somewhat arbitrary, yet combined, the two make but a small proportion; much less than seems to hold good in the West and extra-tropical countries. Some very striking cases may be seen in the Dhurumsala; it has been rarer at the Hopsital, and still more so at the Dispensary.

In all confirmed cases the face is most affected; the eye-brows, nose, cheeks, lips and chin, and the ears, are more or less

swollen and livid, the surface being firm, smooth, bronzed, and shining; it is not so common to find distinct tubercles, the tumefaction being general over a certain space, or as a variety, the appearance may be rather like great thickening of the natural folds of skin, loose and pendulous, with less bronzing and oiliness of surface. The nose frequently becomes depressed, and along the margin of the lips a 'corona' of small tubercles may be seen; from subsequent ulceration and union the aperture of the mouth has been noticed nearly closed: the rim or lobule alone of the ear may be affected. The hairs of the face, ciliary and supra-ciliary, soon drop away: the opening of the eye-lids becomes round, and the eyes unshaded by the lashes acquire a staring look; this, their sallow colour, and the over-hanging brows give an expression not inaptly termed "leonine," or "serpentine," and even "vulpine," to adopt the conceits of old authors. Sensation may persist in some parts of the face and high on the forehead, but it is generally wanting or lessened on the brows, nose, cheeks, and especially the lobules of the ears; and also elsewhere when the thickening is considerable: in the localities just named the anæsthesia may be owing to disease of the subjacent nerve trunks rather than of the small filaments in the skin itself, but it is always present, in some degree, wherever the tumefaction is great.

The mucous membrane of the hard palate sooner or later presents one or two broad pale lines, tubercular or flattened, down the middle; but the soft palate and fauces have been found free from thickening in all the cases examined. The dorsum of the tongue may be studded with distinct pale tubercles, and, as on the palate, superficial ulceration may co-exist: the sense of taste appears to be seldom impaired, but one patient complained of a feeling of heat in the mouth, while eating, and another declared he could not taste even pungent condiments. Ulceration of the skin or tubercles on the face, I have never seen; it occurs however within the nose, which becomes clogged with discharge, and may be present on the ears. Lepers are often "blear-eyed," but I have only once

seen thickening of the conjunctiva and opacity, &c. of the cornea, with blindness; yet this complication is particularly noticed by some writers. The voice being not only weak, but changed in tone, it may be presumed that the mucous membrane of the larynx is more or less thickened, &c.; this alteration of the voice does not occur in simple anæsthetic leprosy.

On the trunk small palish tubercles are seen in all advanced cases, widely disseminated in the skin, and often clustered into rounded groups or masses: their size when isolated is not larger than a pea or horse-bean. The intermediate skin is harsh, shrunken, and dry, and too often stained with dirt: traces of a pale eruption (baras) are occasionally present. The nipples are frequently affected in both sexes, in the advanced stage being converted into mere 'knobs,' sometimes of considerable size; and in male subjects the testes may be very small, but the reverse is sometimes the case. The hair on the pubes is apt to fall off.

The skin of the upper extremities is similarly affected, especially on the outer and posterior surfaces, the tubercles being sparse or clustered, and a few may be found on the dorsum of the hand and knuckles. In more than half the cases I have noted sensation was diminished or absent in the skin, often from the shoulder downward, but the palm of the hand may remain partly sensitive. On the lower extremities the same appearances are visible, the tubercles being rather smaller and less numerous than on the upper. Anæsthesia was never quite absent, the dorsum of the foot at least, sometimes the whole limb, being benumbed. Tubercles (like the eruption of baras) never occur in the palm of the hand or sole of the foot; on the contrary, the skin of these parts has been found thinned, and in consequence rather tender, even when tumefied elsewhere.

I do not pretend from experience to treat of the various stages the tubercles pass through; they may be preceded by a puffy state of the skin, but sometimes at least they appear, from the first, distinct and close-set; and they may certainly be wanting even in advanced cases, the integument being, as already mentioned, on the face, generally tumefied, or thrown into large folds.

On this smooth surface the openings of the sebaceous ducts and emptied hair-follicles are very distinct, and the oily aspect is here owing, partly at least, to increased effusion from the former: I have found the sebaceous glands enlarged after death, under these circumstances. There is often a special character about the tumefied skin, giving the impression of a 'gelatinous' deposit beneath, or in it; and the colour will vary with that of the deposit itself, reddish or pale, as I have ascertained. It should be also observed that a sensation like that of tubercles may sometimes be felt in the skin when to the eye none are clearly visible; but as this and the other varieties of appearance depend on the mere consistence, or limit, of the endo-cutaneous deposit, much stress need not be laid on them. An ulcerative stage of the tubercles has been distinguished, but it is certainly not very common in India: small superficial ulcerations may be seen on the extremities and the ears; never on the face where the tubercles are largest, so far as I have seen, and they very rarely lead to those frightful sores, &c., some authors describe.

Of the destruction of the digits by caries and necrosis of the joints, I shall immediately treat, but this is not necessarily connected with the presence of tubercles in the skin.

Some sort of an eruption (baras in one of its forms) has in the majority of cases been present at the onset of the disease, according to the statements of the patients themselves, and traces occasionally remain even at the advanced stage: this fact confirms my opinion that with leprosy is essentially associated a definite skin-disease. I have already quoted cases which indicated this connection of tubercular leprosy and baras, and another is given below (No. 1), where simple anæsthesia was also present. Enlargement of the lymphatic glands in the groins and arm-pits is common; in the former locality the swelling thus caused has been needlessly specified by the term 'femoral tumour.'

In more than one-half the cases the fingers and toes were affected, being swollen, especially at the joints; the terminal phalanges of one or more are destroyed, and the skin is thinned, smooth, often pale, sometimes bronzed. The distor-

tion is not quite similar to that of anæsthetic leprosy, the swollen digits being spread out, and though stiff, not permanently flexed; the ends are clubbed, and the nails usually converted into horny masses, and scurf accumulates beneath them, or a thin discharge exudes. Fissures and ulcerations occur on the knuckles, at the heels, or on the soles; and loss of parts takes place by sloughing and necrosis, commencing at the joints, rather than by interstitial absorption, but both processes may go on simultaneously. Even when the distortion is considerable some sensation may persist, especially on the palmar aspect of the hands, &c.; hence it might be supposed that the former is not wholly referrible to loss of nervous influence, but also to a general impairment of the nutritive processes, such as undoubtedly attends this form of leprosy in all its modifications, and as compared with the anæsthetic, is one of its fundamental characteristics.

With regard to the *premonitory* symptoms which some authors have described in detail, few opportunities of observation have occurred to me; but as before intimated, I am somewhat sceptical concerning 'prodromi' which last for months or years, and I think leprosy should be compared with scrofula or syphilis rather than with the ordinary exanthemata. On this point, however, my information is deficient, and I am as little acquainted with the general symptoms, if such there be, which attend the onset of the disease. As to their *order* of appearance; an eruption in the mixed form is the first, then the face becomes tumefied, afterwards the trunk and extremities; anæsthesia and distortion of the latter usually appear at a latter period. As the face, including the ears, is the earliest seat of tubercles, so it remains the most affected. The *progress* of the disease is steady and uniform, the local changes become more marked, and the powers of the system decline; after a varying interval of some years, complications, as diarrhœa, &c. supervene, and the whole *duration* of the disease is less prolonged than in anæsthetic leprosy, for in only one of my cases had it extended beyond 12 years. As to the *cause of death*, this has been

already indicated in leprosy generally; a chronic bowel affection is often the immediate one, and it may be associated with fatty degeneration of the kidneys.—M.L. Table (II.) nos. 5 & 6. During life the urine is by no means frequently albuminous, nor the pulse very quick or slow. I have not found that the mental faculties are more debilitated or blunted in any form of Leprosy, than in other diseases accompanied by a similar depressed and miserable state of the system.

In Tubercular Leprosy the constitution is evidently deeply implicated, the disease is widely located, and exhaustion is accelerated by prolonged though limited ulcerations, &c. The state of the leper at the *advanced* stages is even more pitiable than in the other form, his appearance more repulsive, his sufferings greater, though not extreme; but it will not be necessary to again catalogue his miseries. See the annexed fatal case T.L. Table (I.) Case no. 3, and M.L. Table (I.)

Taking mixed and tubercular leprosy together, I find that over one-third of the cases were females: in 7 out of 40 the symptoms appeared under the age of 10 (in 3 females at the period of infancy); under 20 years in 12 cases; under 30 years in 11; in 9 cases under 40 years, and once above that age. In more than one-third of the whole was an hereditary taint, direct or indirect, acknowledged, and it occurred rather most often on the female side.

The second and third of the following cases are appended for the sake of illustration; the first as of general interest.

Case 1.—Simultaneous occurrence of the three forms of leprosy—early stage. A Mussulman, ætat. 35, tin-smith by trade, native of Rajcote, two years sick. The disease began in the hands with loss of sensation in one finger, which spread upwards: after some months the feet were similarly affected, and a year since the face became swollen, &c.: a burning sensation in the extremities was at first very troublesome, but has now subsided. No fever: never had syphilis: is in good health and intelligent. Head,—the skin of the forehead is tumefied, bronzed, and roughened from the enlarged orifices of the gland-ducts; in parts shining and smooth, as on the eye-brows; the nose is bronzed and its alæ tumefied: the skin of the ears red, tumid, harsh: on the temple, cheek, and chin, are some small slightly raised patches

of a reddish-bronze tint, smooth shining surface, and tolerably defined: on the chin a few small tubercles. The patches are placed chiefly over the situation of the larger branches of the fifth cranial nerve: all are benumbed, the sound parts being normally sensitive. The ciliary and supra-ciliary hairs are scanty, the eyes rounded and staring, which with the bronze tint and swelling, impart a decided 'leonine' expression. Nothing visible in the throat. On the trunk are large discoloured patches of baras. The right nipple is evidently enlarged. On the upper extremities are some silvery patches, extensive anæsthesia, and commencing changes in the hands; the fingers are slightly clubbed, but there is thinning of the first row of the phalanges; muscular power is yet little impaired. The lower extremities are similarly affected; there is extensive anæsthesia; discoloured spots, fissures, or cracks at the heels, but no distortion of the toes or nails. The organs of generation appear unchanged, but there is anæsthesia here. He is married, no children: the venereal appetite is now diminished. No hereditary taint that he knows of: has been under active native treatment without benefit. (Dispensary patient, No. 48.)

Case 2.—Incipient Tubercular Leprosy.—A Mussulman, ætat. over 30, a stoker, native of Mhar (where leprosy is frequent); affected about 12 months. The disease began on the face (eye-brows) and spread to the trunk: no premonitory symptoms. At present the skin is studded with small tubercles, most not larger than a pea, colour pale, especially on the trunk; on the face they are bronzed and the intervening skin is tumefied; they are present on the eye-brows, nose, cheeks, chin, the ears are much enlarged, their eminences and rim, including the anti-tragus. Also on the chest (most) and back: shoulders, outer side of arm and forearm as far as the wrist, and on the back of one hand; they are also present on the lower extremities, including the dorsum of the feet, but not to so great an extent. The face is much the most affected: the hairs on the eye-brows, and the eye-lashes are scanty, the beard and moustache little affected. There is doubtful thickening of the mucous membrane of the palate: voice is natural: mammæ not enlarged. Sensation is not perceptibly diminished in any part, except perhaps the lobules of the ears. He denies a syphilitic taint; formerly suffered from rheumatic pains, and has been actively treated without avail. The urine is healthy: sp. gr. 1009. (Hospital patient, No. 71.)

Case 3.—Confirmed Tubercular Leprosy.—Dhundoo, ætat. 26, from near Rutnagherry (coast), 11 years sick. There were first light patches on the skin beginning at the nates, four years subsequently tubercles followed, first on the face, then the legs became benumbed. Was not subject to fever. There is well-marked tubercular thickening of the brows, nose (which is sunken), cheeks, lips, and ears: the hairs on the face are wanting: all these parts are deeply bronzed. The tongue is covered to the tip with tubercles, and two large rows or masses may be seen on the hard palate. The voice is very

hoarse. On the trunk no eruption is now to be seen, but the skin is studded with small tubercles the size of a pea. The same are present on the upper extremities, on the outer side of the arm and forearm, forming elevations of considerable extent: the hands and fingers are swollen, the latter expanded and marked with fissures; some of them are shortened. On the nates are light tubercles, a few on the back of the thigh and leg: the feet are swollen, and some of the toes destroyed, just as in the hands: a bronze tint is not marked, but the skin of the thighs and legs is darker, smooth, and shrunk or atrophied; this appearance indicates the extent of complete numbness, from the middle of the thighs downwards. There is no perceptible loss of sensation on the face, trunk, or upper extremities. The nipples are converted into small knobs. He never had syphilis. Both his father and mother were lepers; a sister younger than himself is healthy, no brother: it is also said that a (paternal) male cousin is a leper, being about his own age. Is married, but has no children. Is in poor condition, having just returned from Ahmednuggur, a long pedestrian excursion. Was formerly in the army. (Dhurumsala patient, No. 93.)

THE MORBID ANATOMY OF LEPROSY.

The following remarks are, like the preceding, entirely based on personal observation, and they will convey, I think, a satisfactory explanation of the symptoms noticed during life. The most striking results of my inquiries concern the peripheral nervous system, or the nerves, in which morbid changes are found probably peculiar to leprosy. With the assistance of the accompanying tables and plates, and notes of miscroscopic examinations, I propose to consider in order the state of the Viscera, Nerves, Bones, Skin, &c. in the two chief forms of this disease: the whole number of autopsies being small, I should have hesitated to lay much stress upon their revelations, were I not convinced, from the uniformity of results, and the precise correspondence to symptoms of the morbid alterations, as well as from the peculiarity of the latter, that the true pathological characters of leprosy, as seen in India, have been fairly made out, or at least sufficiently to indicate the direction of future research.

Of the changes the *Skin* undergoes in Baras, I have already offered one illustration; see page 16.

According to the circumstances preceding or causing death, the *general condition* of the body varies; being adequately nourished when decease has been rapid, or the disease not very prolonged; emaciated under opposite circumstances, but to what extent the impairment of nutrition is referrible to the leprous cachexy and its direct results, alone, independent of concomitant diseases, is not yet ascertained.

1. The *Brain* and its *Membranes*.—A.L. (Anæsthetic Leprosy), 8 cases. In all the membranes were healthy; the Pacchionian bodies presented only normal variations. Brain substance—generally rather soft, especially about the central parts, but not differently in manner or degree to what might be anticipated, considering the influence of climate and the length of time between death and autopsy: the pallor and wet condition may be explained by the fact of the bodies having been injected with a solution of arsenic soon after death; this operation would not interfere, however, with any organic changes, if present. The vascular punctæ and minute extravasations noticed in case 1 did not strike me as very peculiar.—M.L. (Mixed Leprosy), 7 cases. The membranes healthy. Pacchionian bodies once, large and scattered; one at the base of the skull appeared to press upon the 3rd division of the fifth cranial nerve, but as the nerve was unchanged in appearance, it is probable no injurious consequences followed. Brain substance—either quite healthy or slightly altered as above, and the same remarks apply, for when examined early after death, the consistence was unaltered.—T.L. (Tubercular Leprosy). The single case presented, as a peculiarity, only a slightly irregular distribution of pigment in the pia-mater.

Conclusion.—That in ordinary leprosy the brain and its membranes are not diseased. And during life there is an absence of symptoms indicating any affection of the brain.

2. The *Spinal Cord* and its *Membranes*.—A.L. 8 cases. The membranes generally quite unchanged; once (no. 1) several

small opaque-white osseous particles were seen in the arachnoid, chiefly on the posterior surface, and in the dorsal and lumbar regions, some being close to the posterior roots of the spinal nerves, but not in a position to press upon them; their size $\frac{1}{10}$ in. and smaller; form flattened, round, or stellate (very curiously so); they consisted of ossified connective tissue, the bone-cells being normal, and were hollow, containing fat-cells in their interior. These little deposits were clearly only incidental. Substance of cord—healthy or a little softened from natural causes; in two cases the softened parts in the dorsal and lumbar regions appearing reddish in colour, were examined microscopically and no disease was detected.—M.L. 7 cases. Membranes healthy, once stained with bile (case of jaundice, no. 3). Substance of cord: healthy or a little softened from natural causes; once rather firm in the lumbar region, but no other change apparent.—T.L. 1 case. Membranes healthy. Substance rather firm in the lumbar region, but not diseased.

Conclusion.—That in all the varieties of leprosy the spinal cord and its membranes have been found unaffected. During life no symptoms are observed but such as are satisfactorily explained by the condition of the nerves themselves, and none indicating a likely implication of the spinal cord.

The *Roots* of origin of both cranial and spinal nerves in no instance appeared abnormally changed, so as to call for special examination.

3. *Sympathetic Nervous system.*—In all cases the larger ganglia of the abdomen, sometimes of the neck, thorax, and pelvis, were examined, but in none was any evidence of disease. I noticed that the great splanchnic nerves once seemed large and opaque, and twice swollen at a point (symmetrical), also that the communicating branches of the superior cervical ganglion once seemed rather firmer and rounder than natural, but on closer examination did not find clear traces of deposit or degeneration.

The *Ganglia* on the posterior roots of the spinal nerves were a few times examined microscopically, but no clear evidence of

disease was in any instance detected; and the same may be said of the Gasserian ganglion of the fifth cranial nerve, which once or twice was apparently rather small and softened, yet no morbid changes were visible under the miscroscope.

4. *The Heart.*—Was generally healthy; once (A.L. no. 6) soft reddish fibrine was seen on the mitral valve, and this case is otherwise interesting as fibrinous deposits were also found in the left lung, spleen, and one kidney, probably the result of embolism; the patient died of chronic dysentery. Once the aortic valves and lining membrane of the left auricle were slightly opaque (M.L. no. 5). The *Aorta* was always free from atheroma, and I may add, the *arterial system* generally, as far as examined. The Pericardium, usually clear, was twice spotted with opacities: in one of these cases the kidnies were diseased.

5. *The Lungs.*—Were not affected in any special way: in one half the cases the organs were healthy. Adhesions were not uncommon: twice congestion was marked: three times inflammatory condensation of the upper lobes was found (once with albuminuria, twice with chronic dysentery, and in one of these a few firm strumous tubercles were present, the only occasion on which they were detected): once lobular condensation of one lung, especially towards the anterior margin, the intervening tissue being emphysematous, this was the case of fibrinous deposits in the spleen, kidney, &c. above referred to. On one occasion the right lung was found wasted, and the cavity of the pleura filled with bloody serum; and on another, some emphysema at the margins and apex with no further change. The Pleura was never alone diseased.

6. *Intestinal Canal.*—Presented no uniform or marked disease. Three times ulcers were found in the rectum (dysenteric) and in a case of Cholera, small ulcers in both intestines with ecchymoses (M.L. no. 6). The Peritoneum had only once a slightly soddened appearance.

7. *The Liver.*—Was almost invariably healthy: some adhesions on the upper surface were once noticed, and once (M.L.

no. 5) two small abscesses were found; this case was complicated with kidney-disease and pale ulcers in the rectum. In the instance of rapid and fatal jaundice (M.L. no. 3), this organ was of full size, and dark coloured, surface smooth, outer coat clear, edges sharp: the substance had a mottled appearance, owing to the presence of small light-yellow patches, chiefly surrounding the portal canals. In these spots the tissue seemed slightly shrunk, the lobules were distinct: the hepatic cells were loaded with fat, and rather smaller in size than in other parts, the nuclei were often indistinct and pale: in the redder parts the cells also contained some fatty particles, but the biliary matter was more abundant, and their size rather larger than in the light spots. In the fatal case of albuminuria and fever (A.L. no. 2) the liver was also diseased, being much enlarged, mottled, and puckered on the surface: on section the puckered appearance was seen to extend for half an inch into the interior, but there was no distinct deposit around; the substance of the organ was congested and looked coarse: peritoneal coat clear. Both these patients were Portuguese and probably of intemperate habits: as the above appearances of the liver are to be seen in individuals accustomed to drinking, and are not peculiar to leprosy.

8. *Pancreas.*—Always seemed healthy.

9. *Spleen.*—Occasionally soft, enlarged, and the capsule thickened: once fibrinous deposit.

10. *The Kidnies.*—In 15 cases were, one or both, six times noticed as large, as often small; thrice as natural in size. Seven times they were mottled, and in 3 cases with more distinct deposit; once also cysts. I will give the results of minute examination in seven instances, notes of which were kept.

1. (A.L. no. 2.) Organs large, pale, mottled, slightly granular, and cortical substance increased: the uriniferous tubes were sometimes much enlarged, and filled with opaque granular matter; the secreting cells also distended with granules (fat), though their nuclei could be seen. There was distinct fatty degeneration. For the state of the urine, see A.L. Table (1.)

2. (A.L. no. 3.) Kidnies large, pale, flabby, and smooth. Uriniferous tubes greatly distended with fat granules, or oil drops, sometimes free, sometimes within the secreting cells, in these the nuclei were still persistent and contained oil globules. The walls of the malpighian tufts had also undergone fatty degeneration. Urine not examined.

3. (A.L. no. 6.) There was considerable deposit of yellowish fibrine in one of the kidnies: no alteration in size of either: not examined microscopically. Similar fibrinous deposits were found in the spleen, &c.

4. (M.L. no. 2.) Patient died of cholera: urine not examined. The kidnies were not obtained till 36 hours after death, but then found so much softened that it may be questioned if some change had not occurred during life. The uriniferous tubes were hardly to be seen, but no fat globules were present: the apices of the pyramids had an opaque white tint, and the tubes were there filled with a homogeneous and refractile material; the secreting cells were barely visible, but it seemed as if this substance had been deposited primarily within them. These changes, if the result of disease, may possibly have been attendant on the cholera rather than leprosy.

5. (M.L. no. 3.) The kidnies, like the liver, were found to have undergone some fatty degeneration, one being particularly affected. The urine was not healthy, see M.L. TABLE (II.)

6. (M.L. no. 4.) The patient died of cholera. Some of the secreting cells seemed more granular than usual, especially towards their attached surface, but it was doubtful how far this change indicated disease.

7. (M.L. no. 5.) Decomposition of the body had proceeded rapidly. The kidnies were large, firm, mottled, and granular: some of the uriniferous tubes were filled with a granular material, their epithelium being also affected: there were no distinct oil globules. Malpighian tufts healthy. The urine was albuminous.

In these seven cases fatty degeneration was found four times, and in one other case at least the kidnies were decidedly diseased (A.L. no. 1); if we add to them the fatal case (not examined) of the Portuguese woman who was affected with anasarca, &c., the proportion becomes 6 in 16, which is large enough to warrant the assertion I made, that leprosy is not unfrequently accompanied by disease of the kidnies, such as may at least hasten its fatal termination. There is no apparent relation between this and either the duration or variety of the leprosy,

but the instances are too few to permit wide inference. In five cases where death was attributable to chronic dysentery, kidney-disease was certainly present in two, and in a third fibrinous deposit was found; in one of the two just referred to abscess of the liver was present, and opacity of the aortic valves, lining membrane of left auricle, and peritoneum; these and other facts are of interest, but belonging as they do to the general pathology of Bright's disease, need not be enlarged on here. I have, I believe, rather under-estimated the frequency of this complication, but the connection that exists between general cachexia of the system so common in the class to which lepers belong and degeneration of the renal organs, has yet to be definitely ascertained.

The *Supra-renal Capsules.*—Healthy in all cases when examined.

The *Testes.*—Have not been minutely examined: sometimes they were enlarged (from syphilis), and occasionally the reverse; in one youth affected with Mixed Leprosy they were much atrophied, being hardly larger than those of an infant, the seminal vesicles were very small indeed, and the *vas deferens* very narrow. The *thyroid body* was rather larger than usual. The autopsies having been all of males, the condition of the *Ovaries*, &c., has not been ascertained.

The *Blood* was in no uniform condition, nor did it ever strike me as peculiar in appearance.

The *Lymphatic vessels and glands* were not affected in any special way, as far as examined; the latter were noticed as enlarged in about half the cases, either in the loins where a deep red colour was also common, or mesentery where once they were very numerous, or in the groins, &c. A syphilitic taint was as often absent as present. In one case (complicated with syphilis) the opaque cortex of the enlarged inguinal glands contained large granular cells and masses (almost like myeloid cells) which bore a resemblance to those found in the thickened skin. Once (A.L. no. 2) inflammation and suppuration had

occurred in the axillary glands and vessels, the corresponding hand was distorted, &c.; this patient died of albuminuria, but there was no reason, I think, to suspect pyæmia: the blood was generally fluid. The inguinal glands contained a yellowish firm material in the case where fibrinous deposits had occurred in the kidney and spleen: and they are not unfrequently enlarged when ulceration, &c. is present in the foot.

With regard to the condition of the *Blood Vessels* in the distorted hands, &c., on several occasions they were carefully examined, and to all appearance were unchanged, certainly not diminished in calibre: in an injected specimen the size had run freely into the capillaries of the skin and Pacinian corpuscles, nor have I ever seen any reason to infer that deficient arterial supply is the cause of the atrophy or ulceration.

The state of the small *Muscles* is what might be anticipated. I have found those of the little finger entirely converted into fibrous tissue; no fatty degeneration of the fibres was observed. The flexor carpi ulnaris (supplied by a diseased ulnar branch) has been seen undergoing a similar conversion, but the muscles of the forearm generally, and those of the leg, are seldom much changed, nor during life is their action greatly interfered with; the leper making use of his hands and feet, such as they become, to the last.

Morbid changes which the Nerves undergo in Leprosy.—It is here that interest chiefly centres. In order to render them intelligible, the normal structure, as well as anatomical distribution, of the nerves should be recalled to mind, and the more clearly they are recollected, the better will the connection between the symptoms of leprosy and the morbid alterations which accompany it, be understood.

A healthy nerve is uniform in diameter, of an opaque whitish or yellowish colour, and rather lustrous hue; of moderate consistence, and more or less flattened; and its branches retain the same general characters as far as they can be traced. When of

moderate size it will be found to consist of several funiculi (cords or strands), readily visible through its coat, which not only run parallel to each other but frequently communicate, so that numerous plexuses are formed within the nerve-trunk itself; these are particularly evident in the larger nerves, and their significance has been rather overlooked, I think, by anatomists: such an interchange of nerve-tubules is hereby effected that it becomes impossible to trace far those of an individual funiculus, hence disease of the latter may lead to symptoms anywhere in the area supplied by the whole nerve.* Each funiculus is provided with a sheath (neurilemma), and is itself composed of clusters of nerve-tubules similarly isolated; one or more of these may be alone diseased in leprosy. The nerve-tubules are classed as large (motor?) and small (sensory?) according to their size, and there is no question that the latter may be affected to the exclusion of the former, so that disease of even a compound nerve may cause anæsthesia alone: the tubules I find to be in absolute (?) contact, their contents more or less clear and refractile, and semi-fluid or soft; in the mass the tubules have a yellowish tint, and by transmitted light they are opaque.

The diseased nerve is swollen, but not abruptly so, and of a dull reddish grey or semi-translucent aspect; rounded and firm. Its coat of connective tissue is little changed, the funiculi alone being the seat of disease. These, enlarged and grey in colour, impart a streaked or marbled appearance, and when the nerve is cut across they start up, separate and firm, almost as if previously under some degree of tension; in the healthy nerve they rather droop. On further examination, the clusters of nerve-

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* With regard to this arrangement in the sciatic nerve, Bichat observes, "I once employed myself in tracing attentively and to some length all its filaments, and I found that those which above composed the exterior cords were below for the most part those of the centre;" he also remarks that this communication of the nerve-cords does not take place in the roots of the spinal nerves, but only outside the vertebral canal. Anat. Gen. trans. by Coffyn, p. 136. Dissection of a diseased nerve shows exceedingly well these intra-neural plexuses. See preparations in my possession.

tubules are found to have mostly disappeared, their place being taken by a clear gelatine-like deposit, which has separated and compressed them; this is provided with nuclei and fibres, the latter curiously arranged round each tubule, and thus 'mapping out,' as it were, the area into rounded or polygonal spaces, in each of which lie the remains of one or two altered nerve tubules. The following is from notes of the first case:—

(December 1861.) Generally the nerves are rounded and cord-like, semi-translucent and firm; the strands are not clearly seen from the outside, they are enlarged; the whole nerve seems shortened and tense; its smaller branches, and occasionally the trunk, appear atrophied and translucent. For minute examination it is not possible to make a transverse section of a healthy nerve that will maintain itself erect, the unconnected tubules which compose the funiculi fall aside under the least pressure, while in the diseased nerve each segment stands upright and will even bear considerable pressure without being displaced; the tubules imbedded in a firm material do not separate from each other .... the funiculi of a healthy nerve have an opaque white tint, derived from the refractive contents of their nerve-tubules, in disease they are grey, brownish, and translucent, owing to the partial destruction of the tubules by a yellowish deposit, partly clear, partly granular.

Thus it will be seen that enlargement and diminished opacity are the fundamental changes which the nerves exhibit. The general cellular investment, the ordinary seat of neuromatous swellings, inflammatory and other formations, is here but little altered: the amount of enlargement varies from just above the normal size (at the seat of disease, above or below it, the nerve may be smaller than natural) to more than twice that: the colour may be grey, reddish-grey, reddish-brown, or very rarely a dead opaque white: the consistence of all degrees from almost flabby to semi-cartilaginous, but generally firmer than natural; marked vascularity is uncommon; adhesions have been found, but only under exceptional circumstances.

The cutaneous nerves are altered in a similar manner, but are sometimes less rounded and firm.

These changes do not occur indiscriminately in the course of the nerves, but make their appearance at certain selected spots;

for the compound trunks where they are most superficially placed, for the cutaneous nerves immediately after they have perforated the deep fascia. As regards the former, the nerve-trunk above the 'locus morbi' may be unchanged, below it is usually atrophied, but occasionally almost normal in appearance and structure: the apparent extent of disease may be limited to two or three inches, but it is often considerably more; in both sets of nerves the terminal branches will be found atrophied and pearly in aspect, being, in well-marked cases, evidently incapable of performing their functions. A very interesting fact connected with the nerves of compound function is recorded in the TABLES (A.L. III. & IV., no. 2; M.L. IV., no. 4, &c.,) viz., that the sensory or cutaneous segment alone may be diseased, being traceable by the eye for some distance upwards in continuation of the altered cutaneous branch, after it has joined the main trunk: this fact, as well as others, also shows that the morbid changes proceed from the periphery towards the centre, as might have been anticipated.*

The following list, together with PLATE 2, figs. 1 to 6, and the TABLES which contain a brief description of the appearances in each case, comparative measurements, &c., will further serve to elucidate the general features of leprous nerve-disease; I shall afterwards add its microscopic characters.

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* The following has recently been noticed in a subject brought for dissection to the Medical College. The left external popliteal nerve, and the musculo-cutaneous as far as the dorsum of the foot, were enormously but irregularly enlarged and of very firm consistence, all the funiculi being converted into tough fibrous tissue; but, in addition, the central part of each had undergone fatty degeneration, so that long white streaks were visible on the outside giving the appearance of Filariæ being imbedded in the nerve, and on section a soft opaque substance was seen in the axis. Even in this extreme stage of disease a few clusters of almost healthy tubules could be detected. The specimen was interesting as showing a further stage of nerve-disease, viz. that of *fatty degeneration*; it is possible that even *ossification* of the fibrous material may occur and the nerve-trunks be thus converted into bony rods. The corresponding nerves in the opposite leg and some others examined were not affected.

A list of the Nerves found diseased in Leprosy.

Name of Nerve.	Place of Disease.	Parts supplied.
Supra-orbital (cut.)	After emerging and onwards.	Skin of brows, forehead, &c.
Infra-orbital (cut.)	After leaving its foramen.	Cheek, nose, lip, eyelid.
Mental (cutaneous.)	Ditto.	Lip, chin, &c.
Superficial cervical (cut.)	After piercing the fascia.	Side of neck.
Great auricular (cut.)	Ditto.	Lobule of ear, &c.
Small occipital (cut.)	Beyond its origin.	Skin behind the ear, &c.
Descending branches of cervical plexus (cut.)	After piercing the fascia.	Skin of chest, shoulder, &c.
Circumflex (compound) cutaneous branches.	Ditto.	Skin of shoulder, arm.
Internal cutaneous (cut.)	Ditto.	Inner part of arm and forearm.
Lesser ditto.	Ditto.	Inner part of arm.
Intercosto-humeral (cut.)	After piercing side of chest.	Ditto.
External cutaneous (cut.)	After piercing the fascia.	Outer part of forearm.
Musculo-spiral (comp.) its cutaneous branches.	Ditto.	Back and outer side of arm.
Radial (cutaneous.)	Ditto.	Back of hand, outer side.
Median (compound.)	Above elbow and above wrist.	3 outer fingers (palmar surface.)
Ulnar (compound.)	At elbow, above wrist, and in palm.	1½ inner fingers (palmar surface.)
Its dorsal branch (cut.)	After piercing the fascia.	Back of hand, inner side.
External cutaneous (cut.)	Ditto.	Outer side of thigh.
Middle cutaneous (cut.)	Ditto.	Front of thigh.
Internal cutaneous (cut.)	Ditto.	Inner side of thigh and knee.
Long saphenous (cut.)	Ditto.	Knee, inner side of leg and foot.
Popliteal (compound.)	In popliteal space.	
Peroneal (compound.)	Ditto.	
Short saphenous (cut.)	After piercing the fascia.	Back of leg, outer side of foot.
Musculo-cutaneous (compound), its cutaneous branches.	Ditto.	Front of leg, dorsum of foot, &c.
Posterior Tibial (comp.)	Above inner ankle.	Heel and sole of foot, &c.
Plantar (compound), their cutaneous branches.	In sole of foot.	Sole and toes, (plantar surface.)
Anterior Tibial (comp.)	Dorsum of foot.	Inner toes (dorsal surface.)

This enumeration, which is founded upon the tables, is so far imperfect that it does not include many other cutaneous nerves supplying the skin of the trunk and some parts of the head and extremities, but these I have seldom attempted to examine: very much is left for future research. The place of disease as above given is that where the changes were most advanced and probably first commenced, subsequently the 'locus morbi' becomes more diffused by extension. There is little to be said on the comparative liability of any nerve to disease, as in cases at all advanced (and such only have as yet been investigated) almost the whole of the nerves named in the above list were found implicated; it may be inferred, however, that the Ulnar and Radial nerves in the upper, and the Musculo-cutaneous in the lower extremities, are oftenest affected; they supply the dorsum and inner side of the hand, and the dorsum of the foot: and least often, the branches of the fifth cranial nerve on the face.

Microscopic Examination.—Taking the tissues of the nerve in succession, it is found that its coat or sheath (connective, adipose, and vascular) and the investment of the funiculi themselves (neurilemma of connective tissue) are either both unchanged, or the latter may be slightly thickened and marked by fusiform granular masses, or more distinct oval granular nuclei of full size; on its inner surface accumulations of granular matter or nuclei are apt to occur, and here the septa pass off which map out so curiously the area of the diseased funiculus. These are composed of a nucleated fibrous tissue, very distinct and clear; the nuclei, varying in size, are granular, they have occasionally appeared to be free, and when small, at first sight these resemble the ends of the wasted nerve-tubules, in a transverse section. The space inclosed by these septa is polygonal in shape, and from $\frac{1}{400}$ in. to $\frac{1}{1500}$ in. in diameter; it is occupied by a clear homogeneous refractile substance, in which the altered nerve-tubules are imbedded. The latter are usually much changed, their medullary sheath corrugated, and contents granular, uniform (?), and firm; their diameter very irregular, according to the amount of compression they have undergone, and when this has been considerable, it occasionally seems as if the tubules were emptied, their collapsed and folded walls alone remaining: in still more diseased funiculi mere granular streaks or lines of minute nuclei, only are seen; lastly, all traces whatever of the tubules may be wanting, the whole being converted into fibrous tissue, and that without their undergoing fatty degeneration previous to complete absorption. Whether the axis-cylinder is especially affected or not, I cannot say. With regard to the origin and progress of the nerve-disease, it appears that first of all a clear

material (probably albuminous) is deposited between the nerve-tubules, and in this nuclei and subsequently fibres are developed, and the deposit itself may become fibrillated. The nuclei are often large ($\frac{1}{2000}$—$\frac{1}{1600}$ in. long diameter), but I have also found them very small ($\frac{1}{8000}$ — $\frac{1}{4000}$ in.), clear, round, and very numerous; this is a variety worth notice as possibly indicating rapid progress of development. (See PLATE 2, Fig. 9.) The deposit might be regarded as having its beginning in the scanty inter-tubular matrix which it is probable always exists, at least in the larger nerves.

These observations unequivocally demonstrate the limited extent of the morbid process in the nerves themselves, so that some of their components may continue to perform their functions, while others certainly could not; it seldom happens in a compound nerve that some of the funiculi, or parts of them, are not in a sufficiently normal condition, but to the unaided eye all may seem equally diseased; and on the other hand a nerve may appear healthy enough, and yet a segment of it be decidedly ineffective. Histologists have not sufficiently determined the characters of motor, sensory, and sympathetic nerve-tubules to enable pathological inquirers to settle a question like the present, but it would appear from the symptoms and the special tendencies of leprous nerve-disease, that the last-named elements of a compound nerve are those peculiarly affected.

Hitherto I have not seen any traces of the fatty decomposition or degeneration of nerve-tubules along their tracts, centrad or peripherad, which is described by Waller and others as occurring after section of a nerve. I assume that disease begins not at the periphery of the nerves, but at certain elective points, below which, and sometimes above, they become atrophied; but it is quite possible as regards the cutaneous nerves that it may be otherwise, as the wasting below the seat of lesion is not always that of mere atrophy, but rather a conversion into tough fibrous tissue with no diminution of size, which would indicate previous effusion or deposit between the tubules. There is evidently a distinction to be made between leprous nerve-disease and such local injury as might equally interfere with the conduction of impressions, as both symptoms and consecutive local changes point out.

With regard to the nature of the disease, on first impression it would appear to be inflammatory, for the primary symptoms include local pain and tenderness of the nerves, and after death decided redness, if not vascularity, and adhesions to the subjacent tissues are sometimes noticed, as the tables show. The nearest approach, however, to unmistakeable inflammation was observed in a case where sloughing of the areolar tissue, &c., on the dorsum of the foot had occurred, near to which the nerves were decidedly inflamed (as well as the veins), at least in their coats, for the diseased funiculi appeared unaffected. (See A.L. TABLE IV., no. 3.) But the question cannot be thus summarily disposed of, for often there are no signs during life of local inflammation (especially in cases at all advanced) even in the large nerve-trunks, to which the above remarks apply, and they have never been unequivocally observed in the cutaneous nerves. Nor do I think that the microscopic appearances favour this view, pointing as they do rather to the gradual effusion of a very slowly organised deposit; and it is just possible some accidental local cause may have induced inflammation in those cases where it has seemed to be clearly indicated. Noteworthy redness or vascularity is generally absent, and adhesions were found only when the skin had become so shrivelled as to compress the subjacent nerves, or, as at the elbow, when from the position of the limb the nerve was necessarily brought into permanent contact with a firm surface beneath it. Again, as far as I can ascertain of what is known concerning "neuritis," the new formations are seated in the sheath and septa of the nerve, and the same is the case with neuromata, cancer, &c., whereas it is a special character of leprous nerve-disease that, as a rule, the sheath is wholly unaffected, as the microscope itself has many times revealed. My own opinion is that the change is rather one of fibrous conversion or degeneration, commencing either in the envelope or limiting membrane of the nerve-tubules (which is possible), or immediately on its exterior, with the effusion of an organizable material, the subsequent development of which has been already pointed out; not that this statement, however, throws much light upon the subject. Evidently there is no real hypertrophy of the

nerves, any more than in neuromatous swellings; on the contrary, with a far less amount of enlargement than in them, a much more considerable atrophy of the essential nerve-elements ensues; and it has been remarked that neuromata of even large size do not always either interrupt the functions, or cause marked deterioration of structure, of the tubules.

Pacinian corpuscles.—In the hand and the mesentery—the foot has not been examined—these little bodies have sometimes, but not invariably, been found to be enlarged, their pearly tint little changed, and their consistence firm. My notes contain the following examples:—

An elderly man affected with leprosy for 6 years, died in a state of great debility. The hands are much distorted, thumbs nearly gone, fingers shortened and bent, a deep sore over the cuneiform bone: the nerves are enlarged, grey, and tough; the Pacinian corpuscles appear very numerous, are larger than usual, some being $\frac{1}{5}$ in. in long diameter (or double the normal size), and closely aggregated on the shortened digital nerves; this is especially evident in the stump, which is all that remains of the thumb; it would seem that this clustering together is owing to their not having been removed like the other textures of the digits, but driven back as it were by the advancing process of absorption. Change of structure—it is not uniform, some corpuscles are simply hypertrophied, the number and size of the capsules being increased, but the central nerve fibre is either much atrophied or absent; in others a large deposit of granular matter with numerous nuclei, is seen in the central parts, and at the two ends; this imports a semi-opaque appearance, and sometimes a tortuous or spiral tube is present in the midst which has rather the aspect of the displaced and elongated nerve filament. PLATE II. Fig. 10. The blood vessels are very well seen in a specimen I have injected, they are probably more numerous and larger than natural (date Sept. 1860). 2.—A similar case, the hands less distorted. When compared with healthy specimens the corpuscles are found to be larger, their capsules coarser and less regular, and the central parts confused, the nerve filament not being seen: there is a granular deposit, furnished with nuclei or cells, sometimes large and granular, or smaller and more numerous, scattered between the capsules in the middle and at the ends. 3.—Hands little distorted. The corpuscles are not much enlarged, but the granular nucleated deposit and altered nerve are distinct. 4.—Disease in the hands and feet, and in the nerves much advanced. The corpuscles are quite distinct, but doubtfully changed in size or possibly smaller than usual.

From the above memoranda it may be concluded that these bodies undergo in leprosy similar alterations to the nerves, being first enlarged by the deposit of a granular material which subsequently acquires nuclei, and is finally converted into fibrous tissue, after which gradual wasting takes place: their functions must be interfered with from the first, but what particular symptoms would indicate this is not known, since the use of the corpuscles themselves is yet only matter of speculation.

Tactile corpuscles.—The papillæ of the smooth, atrophied, wrinkled skin of benumbed surfaces are either much diminished in size or wanting, indeed the smoothness and absence of cuticular markings (as at the tips of the fingers, palm, &c.) is evidently owing to their absorption. In one case I found the cuticle thin, soft, and dark, the cutis red and soft, its papillæ much fewer (on comparison with a corresponding healthy part), generally shorter, attenuated and inclined; every one contained capillary loops, none tactile corpuscles, so that it may be inferred that those papillæ especially administering to the sense of touch are particularly affected in anæsthetic leprosy. The preparation was from M.L. no. 7, and it offered a striking contrast to the healthy one it was compared with.

Changes in the Skin and Mucous Membranes.—These compound tissues are specifically affected only in the tubercular and mixed varieties of leprosy. On the hard palate and tongue, and in the larynx, the *mucous membrane* is frequently the seat of marked tumefaction, or more distinct tubercles, small and pale in colour; the latter I find to present the same characters as tubercles in the skin. In the larynx the deposit does not extend below the rima glottidis; and it has been found absent in the Schneiderian membrane as well as the pharynx, where if the tonsils be enlarged, it is not from tubercles; tumid glands may be seen in the soft palate, &c. My attention has not been directed to the other mucous surfaces, as they never presented to the eye sufficient evidence of morbid change to call for minute examination; but it seems to have been otherwise in Norway.

In the *Skin* disease is also limited to the dermoid and subjacent tissues, and it consists in the deposit of a plasma in which granules and nuclei subsequently appear: the nerves, vessels, and appendages of the skin being necessarily inplicated, thence result many of the symptoms previously described. This deposit is obviously of the same character as that found in the nerves, and the similarity forms, in my opinion, clear proof of the unity of leprosy, for the pathological changes are also the same in the eruption. The following extracts from my notes will furnish their minute anatomical characters :—

M.L. Case 1.—A section of skin of left cheek, which was reddened, thickened, coarse in aspect, rather lighter in colour (it is often darker), and somewhat shining. The entire substance of the skin is occupied by a reddish deposit varying in thickness from $\frac{1}{8}$ to $\frac{1}{5}$ in. arranged in vertical patches, investing and compressing the sweat-glands and hair follicles : an isolated patch of the granular and yellowish deposit may sometimes be seen in the sub-cutaneous tissue on the outside of a sweat-gland. The sebaceous glands are distended and appear to the eye as opaque white dots (they subsequently become atrophied and destroyed): the hairs are thin and scanty (have been noticed as paler in colour). The cutis is slightly convex; papillæ not seen (but readily in sounder skin around): the cuticle is little changed (often thinned and loaded with pigment); apertures of follicles and gland ducts enlarged. The new formation consists of a homogeneous material, rendered almost transparent by acetic acid, and disposed in layers, as would appear from the disposition of its nuclei and masses; these are of a yellowish tint, granular aspect, size and form irregular (sometimes large pigment cells are seen). In some cases distinct cells are visible with an indication of a nucleus, but in most no distinction of parts can be seen in the granular masses: (the nuclei or cells sometimes appear to be branching out into fibres). In isolated places the deposit occupies the meshes of the areolar tissue, as if it had been effused there. Acetic acid renders these features more evident: æther only appears to make the presence of nuclei in the granular masses more apparent, but has otherwise little effect. See PLATE II. Figs. 13 and 14. Such are the ordinary microscopic features of leprous tubercles or tumefaction: the following is a variety corresponding to that noticed in the nerve deposit :—

M.L. Case 4.—Skin of forehead: the patient had a decided leonine expression without there being any large or distinct turbercles, and the brows were most affected. Hairs very scanty to the eye, but under microscope many small ones are seen, seldom furnished with sebaceous glands. The deposit is not very distinct, but there is a reddish-grey appearance beneath the cutis which

indicates its presence; arranged in the usual manner, but the masses less distinct or isolated: it follows the vessels and ducts, and surrounds the convoluted sweat-gland: its colour is not so decidedly brown as common: + acetic acid and glycerine, the matrix is seen to be clear, homogeneous, scanty; the nuclei very numerous, more or less oval, tolerably uniform in size ($\frac{1}{8000}$-$\frac{1}{3000}$ in.) and devoid of nucleoli and, generally, of granules, edge defined; they differ from the nuclei of the connective tissue, which they somewhat resemble, by their closer aggregation, irrregular arrangement, colour, and more refractile appearance, and they do not seem to branch out into fibres.*

The lobule of the ears present the same characters as the skin elsewhere, an abundant, reddish, firm deposit, furnished with numerous granular nuclei and oil-globules, &c. I need not however enter into further details, only remarking that this new formation must obviously interfere with the functions of the skin, both as a secreting and a sensory organ; its tendency to surround the vessels, glands and ducts is a feature worth special notice, and its miscroscopic structure is probably also characteristic.

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* In case no. 1 Mixed Leprosy, TABLE (I), a scanty syphilitic (?) eruption was present on the trunk and limbs; and a tubercle the size of a split pea, taken from the back of the hand, presented different characters to any of the above; it was placed in the sub-cutaneous tissue, the unchanged skin moving freely over it; its form lobulated and structure of a firm yellowish material, vascular and tough, but readily torn, in which clear, delicate, oval, nuclei, $\frac{1}{1605}$ in. diam., provided with minute nucleoli and sometimes dividing, were plentifully distributed. I concluded that the tubercular eruption on the hand, &c. was syphilitic and not leprous; but that there is a resemblance between the two forms, the following extract will shew: "Gummata or gummy tumours are scarcely ever met with except in syphilitic individuals; they are small, solid, pale tumours generally of the size of a pea, which may be found in the most various parts of the body, particularly in the skin and subjacent tissue, where they are usually larger, equal even to a nut; they are also frequently found under mucous membranes, and it is their ulceration which produces the often considerable destruction in the throat. Some of the affections of the bones are due to them. They are met with in the muscular and connective tissues, in the liver, testicles, lungs, and frequently in the brain. According to Lebert they consist of a rather solid, elastic tissue in which are found, in the finely granular intercellular substance, a number of roundish bodies neither distinctly cells nor cell-nuclei, but resembling tubercle-corpuscles without being identical with them; their similarity depending on this, their intercellular substance rapidly becomes tough and dense, so that the cellular elements can be no longer fully developed. They may pass into suppuration when distinct pus-corpuscles are found, &c." Med. Chir. Rev., Oct. 1861. No. lvi., p. 285. Were it not my object to record facts rather than indulge speculation, nothing would prove more interesting than a comparative view of constitutional syphilis (as now understood) and leprosy. I can only say that as far as I am informed concerning the former, it presents some features by no means agreeing with the latter; yet that points of singular accordance exist, appears undeniable.

Changes in the Bones of the hands and feet.—If it be maintained that the local deteriorations of structure in leprosy are directly or indirectly the result of deficient innervation, there will here be found conclusive evidence of the nutritive dependence of even the osseous system upon nerve influence.* In accordance with what is observed during life, the digits of the extremities are most affected; the terminal phalangeal segments which support their pulps seem to become atrophied at the very commencement of the symptoms, and the other rows in succession, also the metacarpal and metatarsal bones; all in a similar manner. To these the more characteristic changes produced by interstitial absorption are limited; they are, briefly, atrophy of the shaft, part, or whole, disappearance of the head or distal end, with persistence of the bases or proximal ends of the bones. The carpal bones in the hand are more seldom altered, but I have noticed a rarified condition of the ossa cuneiforme and unciforme (particularly its process), and the os pisiforme has sometimes been enlarged or carious; these bones, it will be remembered, are placed at the inner or ulnar side of the wrist; and corresponding to the unciforme, the two inner metacarpals have been seen to be unusually slender when the others were unchanged. As the ulnar nerve is constantly and chiefly diseased in these cases, the explanation of the limited atrophy now referred to seems obvious. In the foot the distal articular surfaces of the three ossa cuneiforme and cuboid are sometimes found rarified or distorted, or the latter may be carious, corresponding to the two outer toes, supplied by that Plantar nerve answering to the ulnar in the hand. This unilateral absorption of the bones of the hand and foot—the inner or outer digits alone—strictly accords with what is observed during life; in one very striking example all the outer side of the foot, in front, was wanting. Occasionally a general diminution in size of the whole hand or foot is witnessed, and then the bones will be found thinned, porous, light in weight, grey in colour, and marked with large

* The bones are affected only when the nerve-trunks of compound function, or those supplying the deeper seated structures, are diseased.

apertures or depressions; such was the condition, to some extent, of the specimen represented in PLATE 3, Fig. 1. Anchylosis is not uncommon between the bases of the metatarsals, and them and the tarsus; or between the corresponding parts of the hand: roughening or outgrowths do not occur. The ossa sesamoidea have been noticed as small, and the bones of the forearm and leg are occasionally rarified in the shaft, especially the latter, and porous on the surface.

A reference to the accompanying illustration will afford some idea of the alterations in form and size which the small long bones of the extremities undergo, in consequence of this interstitial absorption; the curious pointed remnants of the phalangeals and metatarsals, and the very characteristic appearance of the remains of the great toe and thumb are well worthy of notice. I am not able to say why absorption should be most advanced at the distal end of these bones; the peculiarity cannot be connected with the direction of the nutritive canal, for this differs, while the progress of absorption is the same, in the two sets of bones; the cancellous tissue seems to suffer most, but in young subjects the epiphyses have not been found especially affected.

The second method by which destruction of the bones is caused is that of caries or necrosis, which generally occurs at the first or second joint of the digits, extrusion of the fragments taking place on the dorsal aspect: the usual consequences as swelling, &c. attend this process, which, as already stated, I am inclined to regard as incidental rather than otherwise, and as Figures 8 and 9 show, interstitial absorption may precede or accompany it. Marks of vascular excitement are seldom very evident even in this condition, and the periosteum is not red or thickened.

Microscopic appearances.—Four sections, horizontal and vertical, of two metatarsal bones altered by extensive interstitial absorption, when mounted in Canada balsam, exhibited the following appearances:—The compact osseous tissue forming the attenuated remains of the shaft was permeated by *channels* opening at the tip, or on the outer surface, and ending either in rounded

extremities or communicating with Haversian canals; the smallest were only $\frac{1}{1250}$ in. in diameter, and frequently passing off from the latter in a radiated manner, pursued an irregular more or less longitudinal course, often inosculating with other channels or Haversian canals; they reminded me of the tracks of boring insects in wood and shell. The largest channels, sometimes not unlike irregular cancelli, may perhaps be best described as elongated and branching Haversian *spaces;* some were $\frac{1}{50}$ in. across, and enclosed several Haversian systems in their area; from them passed off smaller channels in various directions, which were not unlike dilated Haversian canals, but as with the larger, although bearing a general resemblance to normal structures, were too irregular in their disposition to allow of confusion, and yet sufficiently methodical not to be mistaken for mere cracks or fissures. The bone cells were but little changed, occasionally on comparison with those of healthy bone (of the same part) they seemed small; it did not appear that the minuter channels were connected with them in their origin. The canaliculi being generally invisible in the balsam, I cannot say if any morbid change had occurred in them, probably not. The cancellous tissue forming the base of the shortened metatarsal bones seemed only "rarified."

The appearances thus briefly described, if, as I believe them to be, accurately interpreted, are of considerable interest: I am not aware if such have been previously noticed, but they seem to me to show the way in which interstitial absorption occurs very clearly. Adopting the views of Messrs. Tomes and De Morgan, this process may be said to be a modification of the ordinary method by which bony tissue is removed for the purpose of being replaced, in the course of normal nutrition: it might be termed *molecular destruction*, the tissue absorbed not being restored as usual.

Such are the results of my enquiries into the structural pathology of Leprosy: but I am fully aware of many deficiencies in these observations. I would particularly point out as a subject requiring further investigation, the first commencement and progress of the nerve-disease, and an endeavour should be made to ascertain whether the vaso-motor nerves are primarily affected or not; the condition of the sensory nerve-trunks above the seat of lesion I have not sufficiently examined, and that of the small blood-vessels in the atrophied parts requires further notice. The chemical and vital pathology of Leprosy have not been even cursorily ascertained.

REMARKS ON THE RELATION OF INNERVATION TO NUTRITION.

Upon this subject the phenomena of leprosy are calculated to throw much light; and, as I should interpret them, their teaching is to the effect that the process of nutrition is greatly dependant upon, or under the immediate control of, some influence exercised by the nervous system.

The following considerations seem to me particularly emphatic:—first, there is no other apparent cause for the atrophy of the hands and feet, or the alterations in the skin, except disease of the nerves; and secondly, there is such a close correspondence between the extent of these changes and the area supplied by the affected nerves, as admits of but one inference: I may also add that the duration of the nerve-disease bears a decided relation to the amount of distortion, &c., and that both morbid changes commence simultaneously, thus agreeing in time, as well as local connection and degree. I have never found destruction of the hands, &c., without nerve-disease, nor does the latter exist without some degree of the former.

The nerve-centres themselves, as has been shown, are not affected, but on account of disease in the nerve-trunks, the force generated in them is conveyed not at all, or not readily, to the tissues; or it may possibly undergo some modification in transit, for the nerves are not mere conductors only of impressions or impulses.

Granting that no other series of morbid actions (possible cause) bears the same relation to the symptoms (effect), and that the above is an adequate cause, the only question that remains is as to the manner in which nerve-force influences nutrition—is it exercised immediately upon the vital properties of the tissues, or less directly through the blood-vessels, or

some other medium?* This question I shall not now discuss, but the points above-mentioned deserve further notice.

It has been already shown that in the case of the ulnar nerve the effects of deficient nutrition are strictly limited to the district it supplies, even to the bones of the carpus and metacarpus; that the outer side of the foot suffers in a precisely like manner to the extent supplied by the external plantar nerve; that the skin on the back of the foot supplied by the musculo-cutaneous nerve may be alone affected, &c. &c. As in these instances the amount of motor paralysis is by no means considerable, or in proportion to the anæsthesia—as the atrophy seems to be of a peculiar character—and since there are other elements in a compound nerve besides those belonging to sensation and motion, which it is possible are specially affected in leprosy; as well as for other reasons (amongst which is the liability of muscles to become atrophied without paralysis, or previous to it), I am led to infer that these morbid changes are not the result of simple inaction, as might be supposed.

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* In considering this interesting topic, two sets of collateral influences would have to be regarded, either operating from without (as local exposure), or inherent (as a deteriorated condition of the blood), each of which might exert an injurious effect upon nutrition; and hence with respect to leprosy, it would be necessary to determine whether deficient or altered nerve-influence only favours their effects, or acts as a special morbid cause. My own conviction is towards the latter view.

No one imagines that the organic vital endowments of the tissues are wholly dependant upon nerve influence, any more than the contractility of muscular fibre, but it may be questioned if an animal possessing a nervous system and habitually enjoying its influence, being structurally and dynamically adapted thereto, could be deprived of it, even in part, without corresponding impairment of structure and function immediately ensuing.

Brown-Sequard indeed asserts "that all the phenomena of nutrition and secretion may remain normal when the action of the nervous system on the various tissues is missing" (Lancet, 1858. v. 2. p. 547), but I do not think that opinion is well founded. The case of plants and a-neurous animals, often advanced in illustration of this subject, is not, in my opinion, a parallel one; they never had a nervous system, and it may not be said how far the vital endowments of their tissues have been modified on that account; and the ingenious simile of a horse and his rider falls far short of illustrating the connection of the nervous system and the organic functions; it is really inappropriate, too, for it only shews how the nobler mind can rule a lower.

On the other hand, it may be gathered from my observations that the extent of local change does not always accord with the area supplied by the corresponding diseased nerve; also that the changes do not appear with equal certainty, and that their amount is not necessarily in proportion to the degree of nerve-disease.

To which it may be replied that seldom is a nerve diseased throughout, some of the funiculi, or parts of them, may be much less affected than the rest; hence it is probable these sounder portions have carried on their functions, and this partial action would account for the apparent anomalies: with regard to the last-named objection, it may be further remarked that during life it is impossible to measure precisely the degree of nerve-disease, that after death this oftenest appears rather in excess, and also that the degree of distortion is partly regulated by the state of the vital powers of the system, and the presence or absence of a 'tubercular' taint, as well as by the exposure and irritation the part may have been subject to; nor should the possible limitation of the nerve disease to the sympathetic element be overlooked, in considering this hypothetical demur.

The discrepancies between the results of experiments on animals, and of direct injury or leprous disease of corresponding nerves in man, form one of those points that will soon have to be considered by physiologists; it seems to me they are only, or best, explicable on the assumption that the connection of the nervous system with the organs and processes of organic life is not equally intimate in all members of the animal kingdom, and and in none so close as in man himself.* I cannot, however,

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* That such an assumption is not untenable may be inferred from facts like the following. A strong young man was submitted to operation on account of a large fibro-cystic tumour of the neck, by Professors Busch and Weber of Berlin; the right vagus nerve, below the origin of its superior laryngeal branch, having been unavoidably divided, aphonia, urgent dyspnæa, and spasms quickly ensued, and with the greatest difficulty life was prolonged for a period of sixteen hours. It was observed by the distinguished operators that this lamentable occurrence showed that section

omit noticing some experiments of Dr. Waller on the refrigeration of the ulnar nerve, in man, by the application of ice to the elbow (see Proc. of Roy. Soc., Vol. XI., no. 46), as it might be anticipated that they would illustrate the early symptoms of Leprosy: but the phenomena are rather discordant, so far at least, as the latter are yet known. Waller found that hyperæsthesia temporarily preceded the anæsthesia, and that muscular irritability is increased, as well as temperature and vascularity, at the inner side of the hand; whereas in leprosy there has been no evidence of increase of heat or vascularity in the hand, but quite the reverse.* These phenomena, in the two cases, seem to correspond respectively to paralysis of the vaso-motor or sympathetic nerves (Waller), and to their irritation (Leprosy); and since excitation of the sympathetic produces

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of one vagus will soon cause death in man, whereas in animals this result follows only when both vagi are divided. (Med. Times and Gaz., Aug. 17, 1861, p. 176).

Compare also the experience of Müller (Physiology, vol. I. p. 394-7),—"I have only once among several cases in which I divided the ischiadic nerve in rabbits for the purpose of investigating the reproduction of nerves, observed that the skin of the heel of the paralysed limb gave way and ulcerated at the part upon which the animal rested": with the cases occurring in the human subject, quoted by Hilton (Lancet, 1861, vol. I., pp. 155 & 201), and Swan (on Diseases and Injuries of the Nerves, p. 60); also one recorded in the Med. Chir. Trans. of London, vol. IV.

It may be observed, too, that amongst the lower animals, local deprivation of nerve influence is tolerated in different degrees.

* C. Bernard describes similar symptoms to those mentioned by Waller, as the result of division of the ischiadic nerve in dogs (loc. cit.); and I am rather surprised that no one has called attention to the similarity between them and neuralgia. It seems to me most evident, and well calculated to assist in forming correct views of that disease; judging by inference, too, the employment of galvanism in neuralgia might be expected to afford relief, at least in certain cases.

That disease of the great nervous centres (*e. g.* Paraplegia) is not followed by atrophy, &c. of the extremities, such as is observed in leprosy, is not difficult to explain, admitting that the sympathetic system is the source of those nerve elements especially concerned in nutrition; for the communication of the latter with the cerebro-spinal nerves does not take place until some distance beyond their origin; hence in disease of the centres the vaso-motor nerves are not, immediately at least, implicated. See some late experiments of C. Bernard. Med. Times and Gaz., Aug. 23, 1862.

spasm of the arteries, diminished supply of blood, and "decrease of vital properties," it might justly be advanced as the primary cause of the local atrophy, &c. of the hands and feet in leprosy; but while it is undoubtedly true that the flow of blood is lessened, and the nutritive energies of the parts reduced, in the benumbed and wasted limbs, there are some difficulties in the way of adopting this explanation; such are the circumstance that after death, at least, the blood vessels are not found contracted (see page 59), and that the evident tendency of the local nerve-affection is to destroy rather than simply irritate the nerve-tubules.

To each of the hypotheses I have now mentioned, viz.—that of direct influence of the nerves upon the tissues—that of spasm of the blood-vessels and consequent deficient supply of blood—and that of inaction and its necessary results—some objections may be advanced, in the attempt to explain the local symptoms of leprosy. I own myself in favour of the first-named, but see no reason why a conjunction of circumstances might not be fairly assumed to be in causative operation, rather than one influence alone.

How much alike, on the other hand, direct injury of the ulnar and median nerves, &c., is to leprous-disease, in its consequences, will be evident to any one comparing recorded examples of the one with the present account of the other. *

Lastly, with regard to the influence of external circumstances in aggravating the local changes, reference has more than once been made to this subject; and Brown-Seguard long since illustrated it by numerous experiments on the lower animals, which showed when and why (in his opinion), swelling, ulceration, and gangrene of the hind feet followed section of the sciatic nerve; those individuals alone suffering which were allowed to run about on a hard, cold, paved floor, dragging upon it the

* See particularly a case lately described, Med. Times and Gaz., Aug. 23, 1862, in which besides loss of sensation, &c. vesicles had appeared on the fingers, and the temperature (as measured) was notably reduced.

weakened and insensible limbs, whilst others better protected did not suffer. (Quoted in the Brit. and For. Med. Chir. Rev. 1850, p. 247.)

On some occasions, (A.L. TABLE (IV.) no 3. T.L. TABLE (II.), ulceration and sloughing of the skin and deep-seated parts were found in such close connection with marked nerve disease, that it seemed likely the relation was one of cause and effect.

In concluding these imperfect observations, I should not hesitate to admit that very many points regarding the symptoms and morbid anatomy of leprosy require further investigation, or elaboration; it has, indeed, been to me a matter of some difficulty to compress my remarks on this fresh and intricate subject within these few pages.

Although it was no part of my plan to depend upon others for facts, having studiously avoided recording any not based on direct observation, I must acknowledge the stimulus derived from the labours of M.M. Danielssen and Boeck, my acquaintance with which is limited to a careful review in the Brit. and For. Med. Chir. Rev. 1850, vol. V. It will be seen how far their results have surpassed mine, as regards particularly the condition of the great cerebro-spinal centres, but I can hardly help asking was all this necessary to explain the symptoms of leprosy? With such a condition of the spinal cord as these authors describe, what different and urgent symptoms might we not anticipate! Further information is doubtless needed; but while the leprosy of India must not be looked to for confirmation of the Norwegian disclosures, its anatomical characters do not fail to account for all and every symptom noticed during life. And I think it may be regarded as affording more copious illustration than has hitherto been advanced, of the fundamental physiological doctrine touching the connection of nerve-influence and nutrition, in man himself.

The Pathology of Leprosy in India is a subject of enquiry well deserving investigation. This disease is doubtless associated with well known hygienic conditions; but it has also a special diathesis, which, as it seems to me, most nearly approaches the syphilitic. Both result in the effusion of a low-organized deposit in the skin and nervous system; in constitutional syphilis, however, many of the internal organs of the body, as the Brain, Liver, &c. are affected; this is not the case in Leprosy, the advent of which, too, is not generally preceded by syphilitic infection.

Direct and methodical observations would alone afford data for profitable speculation; these have not been carried out, hence little or nothing of value can yet be advanced on this interesting topic.

As to the Treatment of Leprosy, few words can be needed, in the present state of therapeutics, to indicate its futility in confirmed cases. The question must rather be by what means can we arrest or prevent the effusion in the skin or amongst the nerve-tubules: for after a time, its re-absorption, even if posible, will be of little advantage—the nerve is destroyed. Alkalies and the Iodide of Potassium have certainly seemed beneficial in some of the many cases they have been tried in, but they usually failed. Mercury has never been fully pushed, so as to affect the mouth, for evident reasons. Arsenic has always been inefficacious in Baras. Local applications (of Iodine, Mercury, or Stimulants) have never done palpable good, though long continued. Indigenous remedies I have not tried, being sceptical on pathological grounds of their superior efficacy to the above. Galvanism would be worth testing where it can be efficiently applied; but as yet no attempt at cure has, in my hands, succeeded in effecting more than an apparent retardation of the symptoms, in the earliest and most favorable cases.

TABULATED NOTES OF THE HISTORY, SYMPTOMS, AND POST-MORTEM EXAMINATION OF 16 FATAL CASES OF LEPROSY; WITH THE DISSECTION OF THE NERVES OF THE TRUNK AND EXTREMITIES.

N.B.—In the Tables the diameter of the nerves, both healthy and diseased, is indicated by numbers which represent the *twentieth-parts of an inch* as marked on the dial of the Aphemetric compass; they have been allowed to stand un-reduced on account of better showing, at a glance, the relative size of the nerves.

FATAL CASES.] ANÆSTHETIC

No.	Caste.	Age.	Duration of Disease.	Hereditary influence and Remarks.	Commencement and Course.	Extent, &c. of Anæsthesia
1	Muss.	30	7 months?	Not known. Died of Dysentery and exhaustion. Native of Dacca.	Began in right foot, spread to opposite foot, then hands and face.	None on the face : hands, a feet, extending up the fo arm and leg : it is m complete in the former, bo surfaces being affected.
2	Christ.	29	3 years.	No hereditary taint. Syphilis 4 years since. Treated with Iodine and Arsenic for some time before albuminuria and fever came on, then had Quinine, Diaphoretics, and Antimony : finally stimulants. Died comatose. Came from Tellicherry, where Leprosy is common.	Eruption first on body, then numbness of the feet, hands, and face; the fingers and toes became distorted and partly destroyed. At an early period, the skin of the face acquired a bronze tint, and became a little swollen on the nose, cheeks, and ears.	Doubtful if present in the spc particularly on the che and ears : back, lateral su faces, and nates, &c. on genital organs, but not thi mucous membrane, prob bly. Upper extremities: left hand completely benu bed, and also inner part forearm. Right hand—ana thesia very slight. Lov extremities—loss of sensat in right foot, and leg as hi as knee. On left side co fined to foot.
3	Hind.	35	7 to 8 yrs.	Not known. Is a labourer, from Hyderabad in the Deccan. Died exhausted? phlebitis.	Not known.	Hands and feet, it is impos ble to ascertain the prec extent.
4	Muss.	50	10 years.	None. Is a sailor, had syphilis twelve years since and was treated with Mercury. Native of Bombay.	Began with swelling at the sole of the right foot, near the great toe.	Is present in the hands a feet, extending a short d tance above the wrist a ankle.
5	Hind.	Adult.	Unknown.	A pilgrim. No history obtainable before death.*	Not known.	Not known.
6	Christ.	23	12 years.	Died of Dysentery. History unknown.	Not known.	Not known.
7	Hind.	Adult.	10 years ?	From Rutnagherry. No history known.	Not known.	Not known.
8	No account.			No history known.	Not known.	Not known.

* It is to be regretted this is so frequently the case, the patients being admitted in an almost dying state.

LEPROSY.—TABLE (I.) [J. J. Hospital.

Present State.

ry thin and weak. There is slight depression of the nose: hairs on eye-brows scanty. There are superficial ulcers ie shoulders, hips, scrotum, and the fingers and toes, with partial destruction of the latter, on the right foot the toe having disappeared. All these parts look puffed and shining, as if from the application of oil. He com- s of pains in the joints. Urine is pale, sp. gr. 1003, plentiful, slightly alkaline, and unaffected by heat and nitric [Case referred to in last Volume of Transactions, &c. Appendix p. xxviii.]

umerous light-coloured oval or circular spots, varying in size from an 8-anna piece to palm of hand, having a sh slightly-raised edge; over this skin is roughened and on extremities looks scaly: they are present on the face, , and limbs, and are occasionally symmetrical, as on the mammæ (Baras). Is of spare habit. Muscular power mbs somewhat impaired. Upper extremities—left hand, palm shrivelled, fingers atrophied and distorted, last anx of thumb gone. Right hand, middle and little fingers rather shrivelled, the former has lost a phalanx and ring finger also contracted. Lower extremities—right foot and leg: former contracted, great toe atrophied, shrivelled and dark: a small sore on the sole:—left foot, little toe only atrophied, skin is shrivelled: a sore on the Nothing to be seen in the throat: voice unaffected: sense of smell deficient. Manner dull and heavy, answers ions carelessly. A month before his decease, there supervened depression, fever, and anasarca, with fullness of bdomen; a sense of heat in the body and aching pains: then dyspnœa came on, and he finally died rather enly. The urine was then high coloured (blood?) sp. gr. 1009, contained much albumen, and a scanty brownish ulant deposit: he attributed the change to the medicine (Iodine) he had been taking. Afterwards it became lighter colour and was plentiful. Under the microscope were seen pale, clear casts, others slightly granular, i (?): blood corpuscles, numerous delicate spherical cells with a distinct spherical nucleus, and sometimes yellowish ules; others like epithelial scales. No distinct oil globules were seen.

ry weak and reduced: suffers from fever. No affection of the face and trunk. Upper extremities—right hand, distortion, anæsthesia at the front and back, at the outer side, including the thumb and two next fingers. Left —much distortion: numbness everywhere, except a little at the outer side. Lower extremities—right foot, it and g are swollen and painful, cannot say where sensation is most deficient. Left foot, benumbed on the dorsum and only. Extensive sloughing and suppuration in the right foot: and phlebitis of the superficial veins in the leg, &c.

marks on the face: very doubtful light spots on the trunk. Upper extremities—right hand, light spots and distor- the phalanges of some of the fingers are gone, and the thumb is shortened: left hand, light spots, thickening, and tion; small dark blisters on the sides of the fingers. Lower extremities—right foot, the second toe is gone and there rge sore on the sole close by: retraction of the toes with shortening and distortion. Left foot, toes thickened, some ening, and great toe contracted, and fourth toe almost gone: a recent sore on the sole.

aciation. Superficial excoriations on various parts of the trunk and limbs: great distortion of the hands and feet, destruction of several fingers and toes.

dy in fair condition. Hands and feet alone affected: there being distortion and partial destruction of the fingers oes.

eedingly reduced. Slight flattening of the nose: swelling of the ears: ulcers over the knees and ankles: hy and ulceration of the hands and feet.

aciated, particularly lower limbs; hands are atrophied, skin smooth, and glistening: toes are shortened and thicken- in rough and shrunken: a "femoral tumour."

No. of Case.	Brain.	Spinal Cord.	Sympathetic.	Heart.	Lungs.
1	Membranes injected, healthy. Substance soft and wet, marked by "punctæ": in floor of fourth ventricle and in corp. dentat. of crus cerebelli, both on left side, very small extravasation of blood: surrounding substance not softened.	In the arachnoid were several small white osseous formations, $\frac{1}{10}$ in. diam. or less, form starred. Chiefly on posterior surface, and in dorsal and lumbar regions some were close to posterior roots of spinal nerves, but not in a position to press on them, other membranes and substance of cord quite healthy in appearance.	Appeared healthy in the abdomen: semilunar ganglia normal. At root of mesentery several enlarged Pacinian corpuscles were seen.	Healthy, firm clots in left cavities. Pericardium not opaque. Aorta free from atheroma.	Adherent. He thy. Pleu not opaque.
2	Membranes pale, little subarachnoid fluid. Pacchionian glands not enlarged. Substance wet but not particularly soft, few "punctæ": little fluid in ventricles: choroid plexuses pale, arteries at base healthy.	Membranes healthy, pale, except pia-mater in lumbar region. Substance of normal consistence, but softened in middle of dorsal region, where it had a reddish hue. Microscope failed to detect abnormal elements, the nerve fibres, &c. being very clear. Roots of spinal nerves normal.	Nothing abnormal seen in abdomen.	Large, substance pale, but not diseased. Valves healthy, cavities dilated and filled with clots. Pericardium clear, it contained some serum. Aorta healthy.	Congested, upper lobe left lung s & light colo ed, but reg ing scarlet on exposur air. No ac sions, Ple and bro healthy.
3	Membranes—dura-mater thin arachnoid slightly opaque, many Pacchionian glands. Substance softish, ventricles a little reddish serum. Vessels healthy.	Membranes and substance had all appearances of healthy state, beyond a slight diminution of consistence (from decomposition?)	Left splanchnic nerve seemed enlarged and opaque; but on examination no disease was found. Ganglia healthy.	Healthy, cavities contained clots. Aorta free from deposit.	Congested firm, but crepitant.
4	Membranes—dura-mater pale, adherent to arachnoid along the vertex. Substance rather soft, especially about septum lucidum, some reddish fluid in the ventricles. Origins of cranial nerves healthy.	Membranes healthy, pia-mater vascular below. Substance softened places in lumbar region, and reddish tint of grey commissure, but there was no actual disease. Roots of spinal nerves looked quite healthy.	Healthy. Numerous Pacinian corpuscles at root of mesentery of usual appearance.	Healthy.	Healthy, a rent.
5	Membranes-arachnoid slightly opaque. Substance rather soft and wet, little serum anywhere.	Membranes healthy. Substance of uniform and tolerably firm consistence.	Healthy.	Small. Great vessels healthy.	Right lung i rated belo behind : puckering apex. lung—adh at apex : contractio puckering pleura, a firm tube
6	Membranes healthy. Substance slightly congested, but firm and seemingly healthy.	Membranes and substance; roots of spinal nerves, in all parts normal.	No memoranda.	Mitral valve covered with reddish fibrine. Aorta healthy.	Adhesions side. L condensa parts, sp towards a rior ma interveni sue emp matous.
7	Both membranes and substance appeared healthy.	Membranes healthy. Substance healthy, but softened in process of extraction.	No other notes.	.....	
8	Membranes healthy. Substance the same, but softened at the fornix and septum lucidum.	Membranes and substance had a normal appearance.	In the abdomen was healthy.	Healthy.	Adhesions both sides lung w bloody se pleura. bercles.

PROSY.—TABLE (II.) [*Viscera.*

inal Canal.	Liver.	Spleen.	Pancreas.	Kidnies.	Lymphatics. Glands, Muscles, Blood.	Remarks.
hy. Intes- s collapsed. itoneum not que.	Rather small, adherent on convex surface.	Normal.	Normal.	Capsule not adherent. Small; outer surface smooth, mottled with large white patches, which extended through cortical substance and were defined.	Lymphatics and glands not diseased. Blood coagulated, muscles pale.	
ich contain- lumbrici, hi-digested. estines filled h air. Peri- eum clear, cavity con- ied fluid.	Enlarged, surface mottled and puckered, substance congested and coarse, no deposit, serous coat clear. Gall-bladder small, contained viscid bile.	Rather large, coats thin, substance friable.	Healthy.	Capsule slightly adherent. Both considerably enlarged, surface pale, mottled and slightly granular. Cortical structure more abundant than usual, and encroaching on medullary, pale, coarse, striated, texture friable. Supra-renal capsules healthy.	On left side absorbents near axilla contained pus: glands near were inflamed. Blood mostly fluid. Muscles pale.	Body injected with arsenic solution before examination: much swollen from œdema. Urine albuminous.
ıal.	Somewhat congested, substance healthy.	Soft and pulpy.	Normal.	Capsule not adherent. Enlarged and pale; cortical substance of a light colour (fatty degeneration), traces of cysts.	Blood diffluent.	Examined 20 hours after death.
examined.	Healthy.	Soft.	Healthy.	Capsule normal. One was enlarged, and its colour mottled, as if from deposit. Surface of both smooth.	Muscles pale.	
hy. No opa- of Perito- ım.	Healthy.	Slightly enlarged, surface puckered.	Healthy.	Capsule not adherent Small, surface smooth mottled, with pale spots as if from a scanty deposit. Supra-renal capsules healthy.	Glands healthy, muscles pale, blood clots small.	
otes.	Healthy.	Enlarged, considerable deposit of yellow friable substance. No thickening of coats.	Normal.	One healthy. In the other was a considerable deposit of yellowish fibrine occupying both cortical and medullary substance: no alteration in size.	Yellowish firm deposit in inguinal glands.	
.....	Healthy.	Healthy.	.....	Capsule easily separated. Small, surface pale and smooth.	Glands of a deep red colour in abdomen, enlarged in inguinal region.	

POST-MORTEM APPEARANCES.

ANÆSTHETIC LEPROSY—TABLE (III.)

Cervical Plexus.

No. of Case.	Auricularis Magnus.	Superficial Cervical.	Occipitalis Minor.	Descending branches.	REMARKS.
2	Soon after emerging for the space of an inch, enlarged and reddish-grey.	Lower branch atrophied at commencement, but where it lay over the Sterno-mastoid much enlarged and transparent. $\frac{1}{2}$ then $2\frac{1}{2}$, beyond this atrophied. Normal size=1.	Slightly thickened.	Not affected in appearance.	Left side of Neck. During life the ears were benumbed, but the upper part of the neck was not so: the lower part may have been. In case 7, the auricularis magnus was diseased in the usual manner, being large, soft, and reddish-grey, and streaked.

Brachial Plexus.

No. of Case.	Plexus.	Internal cutaneous $=1\frac{1}{2}$.	External cutaneous$=1\frac{1}{2}$	Median above $=2$ below $=4\frac{1}{4}$	Ulnar at elbow $=2\frac{1}{2}$	Its dorsal branch $=1\text{-}1\frac{2}{3}$.	Musculo-Spiral.	Radial $=1\frac{2}{3}$.	REMARKS.
1	Not affected.	"	"	Above $=2\frac{1}{4}$ Below $=6\frac{1}{4}$ Broad and thick, otherwise unchanged in appearance—this was at the wrist.	Above elbow $=2\frac{3}{4}$ opposite $=6$ below $=2$ Enlargement opposite joint very striking; colour reddened: below smaller than usual.	"	Cutaneous branches. "	"	* Were small and transparent, and very difficult to trace. Skin appeared thinned. In case No. 7 the ulnar nerve was diseased at the elbow.

		reddish and transparent--below this rather atrophied.	for some distance.	at wrist —6 and diseased.	below — 2¼ reddish and transparent.	usual.	alone diseased.	emerging near wrist = 3 and diseased.	ulnar and musculo-spiral to the main trunks themselves, showing that part of a nerve may alone be diseased, while the entire trunk appears to be so; or one part may be more diseased than another.
	Right side.	Diseased.	More transparent than usual.	Enlarged and whitish at elbow, but not transparent.	Considerably enlarged at elbow, but little changed in appearance, atrophied in forearm, looks normal below.	Much diseased, also the strands which join the main trunk for some distance, very striking.	.....	Considerably diseased after emerging.	
3	Left side.	Right side.	Right side.	Right side.	Right side.	Right side.	.....	Right side.	Two enlarged lymphatic glands at the right elbow which may have compressed the internal cutaneous.
	No apparent change, and microscope reveals none decided.	Much diseased, near axilla=1½ soon after=3 swollen and red, below opaque in patches.	Evidently diseased, after emerging= 2¼ some strands may be unaffected.	Near axilla = 3 looks streaked, in forearm = 2 almost normal, near wrist = 5 opaque & whitish.	Near axilla = 2½ at elbow = 4½ reddened, in forearm = 1¾ being atrophied, near wrist = 2½ looks almost normal.	Just after emerging= 1½ round and transparent.		Soon after emerging= 1 in forearm= 2¼ red, swollen & semi-transparent.	
				Left side.	Left side,				
				Enlarged above, firm, round, streaked, smaller below.	Less affected, large as far as elbow, small afterwards.				
4	Right side.	On the arm it is diseased.	Diseased, cord-like and vascular.	In arm = 2⅔ little changed, at elbow = 3⅓ rounded, streaked, in forearm = 2 grey and atrophied, at wrist = 4 diseased.	In arm; grey and rounded, at elbow = 3¾ in forearm = 2 and atrophied.	Slightly enlarged, round and transparent.	.....	Above = 1 turning backwards, below, = 2 swollen & grey, afterwards pale and atrophied its strands could be traced along outer side of musculo-spiral.	Pacinian corpuscles were enlarged on some fingers, but digital nerves look atrophied and pale. Radial nerve most diseased. Distortion, and destruction of fingers, but not thinning, extent of lesion being less than might be antipicated.

POST-MORTEM APPEARANCES.

ANÆSTHETIC LEPROSY.—TABLE (IV.)

Lumbar Plexus.

No. of Case.	Anterior Crural=$3\frac{4}{5}$.	Ext. Cutan.	Midd. Cut.	Obturator.	Long Saphenous.	REMARKS.
1	†	*	*	†	*	†† Did not notably differ in appearance when compared with corresponding nerves in a non-leprous subject. * * * Were somewhat increased in size.
2	Small on both sides, right side = $2\frac{3}{4}$, and transparent, left side = $3\frac{1}{2}$.	Little changed. Ditto.	Little changed. Ditto.	....	Little changed. Slightly atrophied.	In case 4 the long saphenous was found atrophied in the leg: in case 5 the anterior crural was found slightly atrophied, none other examined.

Sacral Plexus.

No. of Case.	Plexus.	Great Sciatic = 6 above.	Popliteal = 3	Peroneal = $2\frac{3}{4}$.	Posterior Tibial below = $3\frac{3}{4}$.	Plantar Internal=2 External=$1\frac{1}{2}$	Musculo-cutaneous (cutaneous branch) = $1\frac{1}{2}$.	Anterior Tibial at ankle = 1.	Short Saphenous 1 below.	REMARKS.
1	Little changed.	Firm, round grey, 5.	.....	Near bifurcation $4\frac{1}{2}$	Above = $2\frac{1}{3}$ and round, below = 5.	Internal=$3\frac{1}{2}$ External=$2\frac{3}{4}$	Before emerging semi-transparent between the muscles = 1, after emerging = $2\frac{1}{2}$ colour opaque white, firm, terminal branches small and atrophied.	Small above increasing below, at ankle = 2 and very large on dorsum of foot.	Above 2, below $1\frac{4}{5}$.	* In case 5 the anterior tibial was found diminished in size and transparent; no other examined. In case 7 the posterior tibial at the inner ankle was diseased, being enlarged and streaked with blood-vessels, but soft and greyish in colour.

			natural size, below $3\frac{1}{2}$ and $4\frac{1}{2}$.	afterwards increasing in size.	round and firm.		and for some distance below, on leg and foot.			ness and distortion observed during life, the nerves of the two limbs were found changed to a different extent; the greater the disease in them the greater the distortion, &c.
			Left side, Looked normal.	Left side. Above normal, except that part continuous with musculo-cutaneous, for some distance up the thigh.	Left side, Near ankle $3\frac{1}{2}$ diseased, but less changed in appearance.		Left side, Before emerging $=1\frac{1}{8}$-$2\frac{2}{3}$ and diseased.	Left side, Less in size than usual, but round and firm.		
3	.....	.....	.....	.....	Right side, Greatly enlarged, when traced downwards it was found to pass into slough on foot, its coats thickened, and partly destroyed, but strands not affected, vascular in parts.	.....	Right side, Before emerging thick, round and transparent, soon after = 2, & much congested (inflamed ?), below whitish and diseased above ankle = 3 it passed down to the sore on the dorsum of the foot.	Right side, Small in size near the ankle.	.....	Superficial sloughs on dorsum of foot, and extensive suppuration, &c. in the sole. Both posterior tibial and musculo-cutaneous nerves passed towards, and into, the midst of these disorganised parts. These facts probably stood in relation of cause and effect. Long saphenous vein filled with pus, all on the right side.
4	.....	Divided high up, inner part seemed large, outer diminished.	Above, cord-like and firm, but little changed in appearance, $=3\frac{1}{3}$ below $=4\frac{1}{2}$	At first flattened $=3\frac{1}{2}$ opposite head of fibula, thicker reddish, striated, $=4\frac{1}{2}$ from this part Ext. Saph. arose.	Near ankle $=4\frac{1}{2}$ very firm, round and of dead-white colour.	.....	Near head of fibula transparent, grey, $=7$ at emerging $=1\frac{1}{3}$ and flattened, then larger, and reddish near ankle, afterwards again atrophied, the outer division most diseased.	Atrophied above, thin transparent and adherent, on dorsum of foot larger.	Decidedly enlarged and changed before perforating the fascia.	It would seem that the enlarged nerves lose some of their peculiar appearance towards the periphery, as if absorption took place of the diseased deposit, or its conversion into white fibrous tissue, producing a less striking appearance than the deposit at an early stage, though not less characteristic.

FATAL CASES.] (I.) MIXED LEPROSY.—

No. of Case.	Caste.	Age.	Duration of Disease.	Hereditary influence and other Remarks.	Commencement and course.	Extent &c. of Anæsthesia.
1	Hin.	25	6 months.	No taint, comes from Rutnagherry, had syphils 4 yrs. ago; temperate habits; died of Cholera.	No specially premonitory symptoms, had ague. It began on face and spread.	More or less over all the patches: no other notes.
2	Hin.	15	?	Not known, lived on the coast: died of Cholera.	Not known.	Not ascertained with precision states that all parts (fac included) feel numb, arm and legs heavy.
3	Por.	40	1 year.	None known: had syphilis a year before the numbness came on; native of Goa; died of Albuminuria and Jaundice.	First anæsthesia of the hand, after thickening of the nose, face, and ears.	Two inner fingers and corr sponding parts of dorsu and palm of left hand, th latter is atrophied but tem perature not lower to sen of touch.
4	Hin.	25	2 years.	None known: never had syphilis: a labourer from Herni (coast): has lived mostly on salt fish and rice: died of Cholera.	Light spots on the skin which subsided, leaving dark (?) stains: numbness followed, hands affected within last year.	There is marked numbness the entire mask and on bo temples, limited below h the body of the lower ja very precisely. Sensation pe sists in the scalp, behind th ears and in the neck. Ba of right hand, except thum left hand, on front and ba of 3 inner fingers & adjoi ing dorsum. No difference temperature to touch.
5	Mus.	35	5 years.	No known taint: several attacks of syphilis: died of dysentery and exhaustion.	Fever; pale patches on the body, small and not benumbed: no traces of them now.	All parts of face slightly b numbed. Upper extremeti left side, anæsthesia in for arm and both surfaces hand, right side slig numbness in forearm a hand. Lower extremities numbness below middle both legs, extending to d sum of feet, not in sole, b when these are placed on t ground a cutting or pricki sensation is excited; no fe ing of heat, the benumb parts feel cold.
6	Hin.	20	6 years.	Father lately become a Leper (anæsthetic variety): he is eldest son, comes from Rutnagherry (coast): died of Cholera.	No premonitory symptoms: began with thickening of skin and numbness in nates.	Numbness in bronzed patch on face, doubtful elsewhe in loins, not on patch there, entirely in upper e tremities from shoul downwards, completely fr hips downwards, in scrot and penis, not in throat.
7	Hin.	35	+10 years.	No taint, never had syphilis, comes from Deccan: died of exhaustion from chronic dysentery.	First, tubercles on face, then on body, afterwards hands benumbed, formerly suffered from fever.	Of most parts of mask and ears, of upper extremi and entirely of hands, lower extremities and tirely so in legs and feet many parts of trunk, cluding the back. It is apparently altogether lim ed to the pale patches.

æsthetic and Tubercular). [J. J. HOSPITAL.

Present Symptoms.

face are reddish-brown, raised, shining patches, particularly on eye-brows and lower lip, imparting a leonine ssion : the ears are but little changed, and eye-lashes remain. On the trunk is a scanty eruption, possibly sy- ic ; no patches, but small tubercles scattered about, specially on nates. On the extremities, the same eruption ; istinct reddish tubercles : little distortion of hands or feet ; but superficial excoriations on the latter.

naciation ; incipient leonine expression; is tolerably intelligent. The extremities are œdematous, skin rough and narked with light patches, no distortion of fingers or toes, is subject to fever, when these appearances are aggra- (?), testes small, a chancre (?) on penis.

ut not much emaciated ; intelligent. There is incipient leontiasis with bronzing of forehead, brows, nose, and s, and ears ; no tubercles on palate ; voice natural ; no eruption on trunk. There is enlargement at the elbow ulnar nerve, with flexion atrophy and deadening of the two inner fingers ; little finger much shortened, skin m curiously drawn aside : probably paralysis of muscles of inner side of fore-arm ; no other part affected though et look swollen, bronzed, and toes rather irregular. The patient died suddenly in a comatose state a short time dmission, death preceded by some fever and intense jaundice. Urine plentiful, light coloured, cloudy, a scanty deposit sp. gr. 1012, albumen doubtful.

ut in tolerable health, intelligent, a peculiar expression of face, almost "snake-like" owing to tumefaction and of the hairs, swollen parts bronzed not shining, ears much enlarged, no eruption, mucous membrane of palate nd marked by an oval group of flattened tubercles, voice not clear, nothing to be seen on trunk, or lower extre- ; no distortion or bronzing of latter. Right hand little finger shortened interstitially ; tips of fingers clubbed, converted into small excrescences. Tips of fingers, excepting the thumb, benumbed, but not the palm. Dor- of hand below the wrist, and of fingers, except the thumb, quite benumbed as far as the ends. Left hand, a r but less degree of distortion of the fingers and nails ; the three inner are affected, and their dorsal surface e benumbed, corresponding to dorsal br. of ulnar, on palmar surface these fingers are also benumbed. Mus- power of hands not impaired, nor muscular sense.

d emaciated ; feet œdematous, bowels relaxed, some tumefaction in parts of face, hairs on brows partly remain, epressed, ears tumid and red ; pale, flattened tubercles on hard palate, voice feeble and hoarse. Upper extremities ers on hands, fingers swollen, pale and shortened ; on left side, middle finger is gone, nails atrophied and dis- on right side, considerable distortion, nails especially affected. Lower extremities—both legs œdematous, feet ied, skin harsh and cracked, toes swollen and smooth, sores on dorsum of left foot preceded by blisters : urine pale-coloured sp. gr. 1008, slightly alkaline, albumen plentiful ; whitish, scanty deposit, composed of granular , crystals of phosphates, a few delicate granular cells, vibriones, &c.

.,—skin thickened, marked with diffused shining swellings of a bronze colour, best seen about middle of face, s of ears, nose slightly fallen, hairs on brows remain, voice rather hoarse. Trunk—a few, light spots in various in loins, skin bronzed and tumefied. Upper extremities—a few, light patches in various parts, a few small les in forearm, fingers thickened, shortened, swollen, bronzed, nails atrophied, occasionally a puriform dis- takes place from under them. Lower extremities—tubercles on thighs, a similar state of feet and toes. ls imperfectly developed, specially testes ; skin of scrotum thickened and wrinkled. Throat—white patches in . Voice rather hoarse, tolerably intelligent, remarkably stunted in size and growth, thin and cachetic.

iar thickening of face, particularly nose and ears, loss of hair, ulceration of rim and lobules of ears, marks of pox. A broad, pale, ulcerated line in middle of hard palate with tubercles. Voice hoarse and weak Numerous atches on skin of trunk ; abdomen swollen. Upper extremities—light coloured patches, smooth ; fingers flexed, ed and partly destroyed. Lower extremities—similarly affected, except toes, which are not yet distorted or ed. Mask, hands and feet have assumed a bronze tint. He is in a miserable condition, but sufficiently gent.

Post-mortem Appearances.] (II.) MIXED LEPROSY.—

No. of Case.	Brain.	Spinal Cord.	Sympathetic.	Heart.	Lungs.
1	Membranes and substance apparently quite healthy.	Membranes healthy. Substance rather firm below, also grey matter; no change in appearance. Roots of spinal nerves healthy.	In the abdomen appeared healthy; a swelling on left *splanchnic nerve*, it was probably ganglionic.	Healthy, loose dark clots in its cavities.	Healthy, lit congestion, opacity pleura.
2	Membranes healthy. Substance, soft, but equally so all over the brain.	Membranes healthy. Substance, rather soft, but so in all parts equally.	In the neck and abdomen seemed hardly changed.	Flabby, fluid blood in all cavities, aorta healthy.	Healthy, no a hesions, &c.
3	Membranes pale and stained yellow. Substance of natural consistence and appearance; "punctæ" yellowish and fluid in ventricles. Cranial nerves looked healthy.	Membranes stained yellow. Substance, also yellowish, particularly roots of nerves; to all appearance normal.	Not specially examined.	No disease; loose clots in right side.	Slightly emphy sematous margins a apex.
4	Membranes pale. Substance everywhere firm and pale: small cysts in choroid plexus. Cranial nerves healthy.	Membranes pale. Substance, of a particularly healthy appearance throughout; also roots of spinal nerves.	In chest and abdomen, healthy in aspect.	Healthy.	Healthy.
5	Membranes pale. Substance soft and pale, especially in interior, about the optic thalamus, but not pathologically so. Origin of cranial nerves healthy.	Membranes pale. Substance pale and soft throughout, grey matter very distinct, roots of nerves looked a little thin.	In chest and abdomen, normal; also in the neck only some of brs. of *sup. cerv. gang.* seemed rather firmer and rounder than natural.	Slight opacity of aortic valves and lining membrane of left auricle; also of pericardium: otherwise healthy.	Considerably congested: opacity pleura.
6	Membranes healthy. Pacchionian bodies large and scattered; one at base of skull seemed to press on 3rd div. of 5th, which nerve however was not changed in appearance. Substance quite healthy.	Membranes healthy. Substance firm and healthy, also roots of spinal nerves.	Healthy in aspect in cavity of pelvis; some ganglia seemed rather firm and enlarged.	Healthy.	Healthy.
7	Membranes pale. Substance softened about central parts: posterior cornua of lateral ventricles large; cranial nerves healthy.	Membranes healthy. Substance rather soft, compressed during extraction of cord; spinal nerves healthy.	Semilunar ganglion of one side seemed rather large, no disease detected by microscope.)	Healthy: small opaque patches, on pericardium.	Inflammation adhesion, per lobe lung, mucus trachea.

(Anæsthetic and Tubercular.) [*Viscera.*

ntestinal Canal.	Liver.	Pancreas.	Spleen.	Kidnies.	Remarks, &c.
e healthy in pearance, no acity of peri- neum.	Somewhat congested and coarse-looking, but no evident disease.	Healthy.	Small and healthy.	Capsule healthy, of usual size and colour, cysts in one: minute structure healthy.	P. M. E. 12 hours after death: urine copious, pale, alkaline, sp. gr. 1011, not affected by heat and nitric acid.
thy, mucous mbrane pale.	Of natural size and appearance. substance rather soft and pale.	Red and rather soft.	Large, of purple colour, soft; capsule clear.	Capsule slightly adherent or thickened, organs rather large, mottled, and a little granular; substance very flabby and soft, s. r. capsules healthy.	P. M. E. not until 36 hours after death.
ared healr, lumbrici.	Of full size, dark coloured, smooth surface, sharp edges, serous coat clear and free of adhesions. Substance mottled, light yellow patches around portal canals, firm; the light patches were owing to fatty degeneration.	Healthy.	Very large, friable, free from adhesions.	Capsule transparent, slightly adherent, one considerably enlarged, outer surface smooth, pale; section, parsnip-like, evidence of a light deposit and fatty degeneration, stained with bile.	P. M. E. 5 hours after death. Nerves not dissected by accident. Urine unhealthy.
lthy in aspect.	Of rather small size, but particularly healthy.	Healthy.	Enlarged, substance friable; no adhesions.	Capsule normal, small and firm; surface pale and smooth, cortical structure palish and rather thick.	P. M. E. very soon after death, rigor mortis.
oneum htly soldenit contained ittle yellow um, atonic ers in Rec- n.	Large and firm; it contained two small abscesses filled with yellowish mucus-like pus, one superficial, one deep.	Healthy.	Enlarged, firmly adherent; capsule thick and spotted.	Capsule thin and adherent, organs large and firm, outer surface mottled and rough, cortical part thick & light coloured, spotted with cysts, s. r. capsules healthy.	P. M. E. made 8 hours after death: decomposition commenced soon. Urine contained albumen. Phlebitis in left arm.
us membne congested intestines l marked h small ulss, ecchymoin stomach l intestines.	Of usual size, mottled; gall-bladder filled with yellowish green bile.	Healthy.	Healthy, not enlarged.	Of usual size, congested but otherwise in a particularly healthy state.	Body contained fat: died of cholera.
us membne vascular l ulcerated Rectum.	Healthy, the distinction of brown and yellow substance very apparent.	.....	Adherent capsule thickened; texture healthy.	Capsule not adherent, size small, outer surface smooth, on section no evident morbid change was seen.	P. M. E. 18 hours after death.

POST-MORTEM APPEARANCES. } MIXED LEPROSY.—(III.)

Cranial Nerves.

No. of Case.	Origins.	5th Pair.				Remarks.
		Gasser. Gangl.	Supra-Orbital.	Infra-Orbital.	Mental.	
1	.....	.....	Slightly rounded?	Atrophied?	Rounded?	Numbness in patche on face, doubtful i elsewhere.
2	.....	On left side grey matter and 3 divisions atrophied, 2nd and 3rd most.	Frontal n. reddish and slightly atrophied, after emerging on forehead, round grey and firm.	Looked small and reddish, brs. to nose and lip flattened and red, diseased.	Inferior maxill. not affected. on terminal brs. a slight adherent deposit.	Other cranial nerves healthy, except facial changed as 5th on the face.
4	Nothing abnormal seen.	Normal, and main divisions.	After emerging large reddish and semi-transparent.	Unchanged in appearance.	Unchanged in appearance.	Right side only examined. Numbness of face during life skin tumefied.
5	Pale and soft, not diseased.	Slightly soft and atrophied?	On emerging = 2 (normal = 1) white and opaque, then red and characteristically enlarged, afterwards suddenly small and pale: nasal br. probably atrophied.	Appeared small, but white, though less firm than usual.	Perhaps a little reddened and rounded.	8th pair healthy Skin of forehead slightly infiltrated and hairs scanty and small.
6	.....	.....	In several of branches deep red stains were seen which may have indicated deficient nutrition.			Other cranial nerve healthy, excep *Spinal access.* als stained.
7	Healthy.	Healthy.	In orbit, round and firm, its brs. diseased, greatly enlarged.	Normal.	Normal.	Microscopic examination shewed nu cleated deposit i fibres of *Sup. orbit n.*

ST-MORTEM
PPEARANCES.

MIXED LEPROSY.—(III.) *continued.*

Cervical Plexus.

Superf. Cervical = 1.	Auricularis Magnus = $1\frac{1}{3}$.	Occipitalis Minor =	Descending Branches.	Remarks.
Atrophied.	Soon after emerging = $3\frac{1}{2}$, diseased.	Slightly diseased rounded, $1\frac{1}{2}$.	Their trunk of origin vascular.	Ears but slightly changed in appearance.
Left side, atrophied?	Left side, = $2\frac{1}{4}$ after emerging and reddish-grey, before emerging = $\frac{5}{6}$ and white. Right side, much diseased.	Slightly changed.	Not notably changed.	Right ear more affected than left. Root of *auric. mag.* and corresponding spinal nerves and their ganglia, not apparently changed.
Some terminal branches looked red.	Just after emerging = 2, and changed in usual manner, terminal brs. less affected.	Probably slightly diseased after emerging.	Doubtfully affected, perhaps a little large but opaque.	Ears much enlarged and benumbed, no numbness of neck. Right side only examined.
Affected, but not much.	Soon after emerging = $2\frac{1}{2}$, red and round.	Perhaps a little less in size.	All probably affected, particularly the clavicular below the clavicle.	Ears much enlarged. C. plexus itself looked thin.
Healthy.	Semi-transparent, and strands indistinct = $1\frac{3}{4}$ largest just when reached ear.	Small.	Going to shoulder and pectoral region were decidedly enlarged and semi-transparent.	Phrenic and other muscular brs. not changed. Ears were swollen.
Decidedly enlarged after piercing the fascia.	Greatly enlarged = $5\frac{1}{2}$ flattened and grey, terminal brs. small.	.....	All seemed to be healthy.	Lobules and rim of the ears superficially ulcerated, not greatly enlarged.

Post-mortem Appearances. MIXED

No. of Case.	Plexus.	Musculo-cutaneous in forearm =1½	Internal cutaneouss =1½	Musculo-spiral.	Radial, near wrist =1⅔
1	Normal	Much enlarged and red before emerging.	At first =1, after=2, and diseased, main brs. very large.	Appeared atrophied..	Before emerging =2, af terwards =3, thick swollen and grey, ter minal brs. much diseas ed.
2	Some cords looked tumid and red.	Above elbow=1½; flat and thin after emerging = 2⅓; round and reddish grey, also terminal brs. which join Radial.	Near axilla= 1 ; atrophied, after emerging =2; diseased and so terminal brs.	Just above elbow slightly grey in entire circumference.	At commencement = 1 marbled, grey, round after emerging =4, re grey and much thicken ed, terminal brs. atroph ed flattened and red.
4	.....	Right side.	Right side.	.....	Right side.
		After emerging =2, and diseased.	In forearm, anterior br. was 2½ and diseased.		Healthy above ; after em erging decidedly disease =4. Left side consider ably changed but not red.
5	Left side only examined.	Diseased in forearm.	Both nerves of this name were much enlarged at their lower branches and so the *Intercosto-humeral*.	.....	In forearm =1⅓; befo division at the wrist= and branches of distu bution also diseased, e larged.
6	Not diseased, nor upper branches.	At commencement=1 below its anterior branch=2.	At origin almost transparent =¾, below middle of arm =2, posterior br.=2, anterior br. =1½, *Intercosto-humeral* on emerging ½ at elbow before dividing 1⅘, and in arm of same size.	Somewhat enlarged, especially cutaneous brs. to back of arm and forearm.	At first small =1, afte wards when turni backwards, grey a = 2½.
7	One of cords looked affected.	On emerging diseased =2¾, lower down, the two divisions increased in size the anterior =3, and reddish.	At origin= 2, after emerging= 4, and semi-transparent; lower down, branches became pinkish, and terminal filaments were atrophied. *Intercosto-humeral* after passing on to the arm became much enlarged and of a reddish colour=4.	Probably healthy.	At first= 2 and norm just before emergi increased to 4, and t terminal divisions la and diseased.

PROSY.—(IV) [*Brachial Plexus.*

Ulnar at elbow =$2\frac{1}{2}$.	Its Dorsal branch=1 to $1\frac{2}{3}$	Median, in forearm=2, at wrist =4.	Remarks.
elbow=$1\frac{3}{4}$ opposite the t=6, swollen, red, and , very characteristically cted; lower down =$2\frac{3}{4}$ phied; and on wrist=$3\frac{1}{3}$ lish.	Diseased, rounded at first but spread out on dorsum of hand and also much diseased.	Near axilla, marbled in appearance=3, specially on outer side to which *musc. cutan. n.* was apposed. Left side in forearm=$2\frac{3}{4}$, but an inch above wrist suddenly enlarged,=$8\frac{1}{2}$ and broad, thick, grey, in the palm brs. looked little changed.	For the striking condition of *median n.* see Plate 2, fig. 3.
axilla atrophied and soft ; about middle of arm len and grey ; at elbow $6\frac{2}{3}$, very characteristic appear- ; at middle of forearm rounded, afterwards again streaked, red, above wrist and onwards. digital brs. ish grey and soft.	Much diseased, terminal brs. of same appearance as digital nerves.	Near axilla=$2\frac{1}{2}$, being rather small, bend of elbow=$3\frac{1}{4}$ and rounded, in forearm=$2\frac{1}{4}$ grey and rounded. At wrist = 7, marbled and pale, digital and muscular brs. also diseased and *anter. inteross. nerve.*	On left side *ulnar n.* only exposed, found to be symmetrically affected with the opposite.
Right side.	Right side.	Right side.	
axilla, softish, at elbow oy, diseased =$5\frac{1}{2}$, in fore- $2\frac{2}{3}$ a grey tint on inner continuous with dorsal brs. rence very evident where r separated. In palm a large and so digital brs. acing these to tip of fin- where pulp was shrunk red, they were larger and ish. Left side equally nore affected—reddish at v.	Evidently much diseased ; reddish flattened and flabby,= 3. Left side diseased and afterwards atrophied being different appearance to above.	Near axilla=3, at elbow slightly diseased=$4\frac{1}{2}$ being marbled. in forearm=3, looking almost normal at the wrist=6, but not much changed otherwise: on left side, not so enlarged at wrist.	All the nerves even when clearly diseased were of a palish colour and the texture relaxed, increase of bulk very apparent. It is evident considerable alteration may be present in the nerves, and yet beyond size, little change of appearance, Pacinian corpuscles not enlarged.
xilla= 2. bend of elbow forearm=$1\frac{1}{2}$ near wrist after giving off dorsal ches : near elbow irregu- swollen and red, adherent contracted opposite the .	Considerably enlarged.	In arm=3, natural, in forearm=2, same at wrist=6, being also reddened, digital nerves were semi-transparent, but not small.	Superficial ulcerations on fingers, cutaneous veins filled with adherent and purulent coagula.
in $1\frac{3}{4}$, below semi-trans- nt marbled and near elbow just below elbow = $1\frac{1}{2}$, e wrist=$2\frac{1}{4}$.	Enlarged.	In arm streaked with yellowish lines = $2\frac{1}{4}$, middle of forearm = 2, and less altered, beneath annular ligament =$5\frac{1}{4}$ muscular brs. healthy.	*Circumflex n.* was diseased, particularly brs. to skin of back of shoulder and upper part of posterior surface of arm. Digital nerves had almost usual appearance. No palmaris longus muscle in his small hand.
la=3, streaked with ves- and flat below middle m 6-7, round, not very reddish-grey, semi-trans- nt, on forearm above, 3, lked and whitish, lower , larger and still grey.	Diseased, not much enlarged but grey, semi-transparent, and rounded in form.	Looked tolerably healthy in arm, in forearm=3, and lower down streaked with grey lines, rounded and pale =8, In palm branches a little large, but were semitransparent, could be traced to tips of fingers.	Several Pacinian bodies were seen and some of rather large size.

POST-MORTEM APPEARANCES.

MIXED LEPROSY.—(V.)

Sacral Plexus.

No. of Case.	Plexus, Gr. Sciatic, &c.	Posterior Tibial at ankle = 3½	Plantar.	External Saphenous=1	Peroneal=2½	Anterior Tibial =1.	Musculo-cutaneo = 1½.
1	Gr. Sc. large flattened, not diseased; cutaneous branches of small sciatic not changed.	At ankle = 4, round and red, but not from inflammation probably.	Rounded and reddened, but not so much diseased as the cutaneous nerves of the foot.	The communicating brs. were healthy; the main trunk = 1½, after emerging it became reddened and large =4, on dorsum of foot, tough, grey and adherent.	At first =2½; afterwards rounded, red, streaked with vessels =5½ to 8, marbled and semi-transparent.	At first small, atrophied in leg, at ankle red =2, and diseased also its brs. on the foot.	At commencem =1 and white, emerging=2¼, and irregula thick, at an 4⅙, thick and herent, atroph at intervals, dig brs. atrophied.
2	.....	Diseased at ankle	.....	.....	.....	.....	Diseased in leg foot.
4	.....	Enlarged, red, and soft.	.....	.....	.....	.....	Very large, red, and soft.
5	Gr. Sc. not changed.	Little changed, rounded? but diseased.	Reddish, slightly enlarged.	.....	Little changed; probably large and round.	The same.	Diseased, but much alte round and tr parent.
6	Small Sciatic, cutaneous filaments on thigh decidedly affected.	At first = 4½ then = 3½ in middle of leg = 6 and diseased, at the ankle=7 and reddened.	.....	Peroneal br. =3, popliteal br.=1, trunk very red and firm like a cord.	Near head of fibula =5.	Firm, round =2¼.	At first 1¾, aft became la flattened, and
7	Gr. Sciatic largish, not diseased.	In middle of leg =4 rather firm, at ankle=9½, it would be difficult to exaggerate this striking change.	.....	Of reddish grey colour, much diseased in whole length.	Enlarged near head of fibula, and its cutaneous branches.	Large, red, semi-transparent on dorsum of foot, where are ulcers, sloughing of skin, &c.	Much enlarge its very o and on emer more so; atro on dorsum of

T-MORTEM
EARANCES.

MIXED LEPROSY.—(V.) *continued.*

Lumbar Plexus.

lexus, &c.	Anter-Crural=4.	Exter.Cutan. =1	Middle Cutan. =1¼.	Internal Cutan.	Obturator.	Long Saphenous =1½
.....	Strands broad and thin =5½.	Atrophied?	Same.	Same.	Main brs. healthy.	Atrophied in leg, below reddish and transparent.
lthy also *enito-cru-l n.*	Normal.	On emerging atrophied below =2; thickened, yellowish, and semi-transparent.	Before emerging, atrophied, lower down = 2½ and affected in same way.	At first small, below very much enlarged =2 thickened and transparent.	Healthy.	At origin 1¾ and normal, behind the knee-joint, before emerging=3⅔ and more vascular.
thy and s. in the lvis.	.....	All these branches are much enlarged, of a reddish-grey colour and semi-transparent, the increase of size is most striking and extends from perforation of *fascia lata* onwards.			.....	Enormously enlarged from knee downwards, and brs. over patella.

FATAL CASE.] TUBERCULAR LEPROSY.—TABLE (I.) J. J. HOSPITAL.

Caste.	Age.	Duration of Disease.	Commencement.	Present State.	Other Remarks.
Hind.	20	4 years.	By pale spots, especially on face, not now visible.	Much emaciated, and stunted in growth. Well-marked tubercular thickening of eye-brows, cheeks, lips, and chin, and particularly of ears, with loss of hair on the first and face generally, the expression is very characteristic (Serpentina), nose depressed, eyes round and staring, &c.; the skin is smooth, shining, and rather pale in these parts, giving the impression of there being some soft effusion beneath. Voice feeble. Is intelligent enough. No eruption on, or tubercular thickening of skin of trunk, but this is dry and harsh. No distortion of the extremities, which however are rather œdematous, and there are large sloughing sores at the ankles close by the Tendo Achillis, also a large circular slough over the right knee-pan. Nipples very small: testes not so. Palate sensation is diminished on brows and cheeks, more so on ears; also back of left forearm and left hand, hardly so on right upper extremity. Lower extremities not examined on account of his great debility. Suffers little pain, and has chronic Dysentery.	Is not aware of hereditary taint, but knows very little about his family. Denies syphilis. Died of Chronic Dysentery.

POST-MORTEM APPEARANCES.] *Viscera.*

Brain, &c.	Spinal Cord, &c.	Sympathetic.	Heart, Lungs.	Intestinal Canal.	Liver.	Pancreas, Spleen.	Kidnies.	L. Glands, Blood, Muscles, &c.
Membranes, pale but clear: pia mater marked with grey patches of pigment. Substance, pale and rather soft, particularly in central parts, but no morbid appearances. Cranial nerves at origin, pale but healthy.	Membranes healthy. Substance tolerably firm, particularly at lumbar swelling, softened by accident in dorsal region; grey matter seemed healthy, and so roots of spinal nerves.	Both splanchnic nerves near the Diaphragm presented a firm swelling, apparently ganglionic. Semi-lunar ganglia well seen, healthy.	Heart healthy, aorta free from atheroma. Lungs slightly adherent but healthy, specks of opacity in pleuræ.	Mucous membrane pale but healthy, except in rectum where numerous small ulcers were seen and patches of inflammation: no opacity of peritoneum.	Healthy in appearance, left lobe rather larger than usual. Gall-bladder contained healthy bile.	Pancreas healthy; Spleen large and soft.	Capsule slightly adherent; size of organs full; surface smooth and pale; cortical substance pale, but normal in amount. Sup. Ren. Capsules healthy.	Glands large and red in loins, very numerous soft, and pale in Mesentery as if from deposit. Blood coagulated; muscles pale.—P. M. E. made 23 hours after death.

T-MORTEM
EARANCES.

TUBERCULAR LEPROSY.—TABLE (II.)

Cranial, Cervical, and Brachial Nerves.

ranial Nerves.	Cervical Plexus.	Brachial Plexus.	Remarks.
ly examined, out- the skull, *supra al*—trunk rather branches appa- y healthy. *Infra- al* and *mental*— hy in appearance.	Superficial branches only examined. *Auricularis magnus* just after emerging acquired a broad flattened appearance and was of a reddish-grey colour being decidedly diseased =2, (normal =1⅓). The *other branches* as far as traced appeared healthy.	Left side.—*Internal cutaneous* main branches healthy in arm, but the posterior branches soon became enlarged, reddish and evidently diseased. *Lesser internal cutaneous* was also diseased soon after emerging from beneath the fascia, and onwards. *Ulnar* affected in the usual way about the elbow, and again near the wrist; here the *dorsal branch* was similarly diseased, and equal in size to the main trunk. *Median* seemed rather large and round just above the elbow, but near the wrist was flattened considerably and diseased. Right side.—*Internal cutaneous* was considerably less affected than on opposite side, *Ulnar* and *Median* diseased to a considerable extent, but not of firm consistence as usual.	When compared with the alterations of sensibility these changes in the Nerves afford satisfactory explanation. There was generally a want of roundness and firmness in the affected nerves, indicating a slighter degree of disease than usual.

Lumbar and Sacral Plexuses.

Lumbar Plexus.	Sacral Plexus.	Remarks.
cutaneous affected in a characteristic manner just after perforating fascia lata, and the branches going e knee, where, on the right side, a large sloughing ulcer of round *al saphenous* also diseased below nee, and its branch to the skin ont of the joint.	*Musculo-cutaneous*, decidedly but not greatly diseased. *Posterior Tibial* much diseased on both sides at the lower part of the leg and near the sloughing ulcers on the feet.	It may be asked, is there not a causal relation of the diseased nerve-branches to the local destruction of the integument, or at least a predisposition to exhaustion of vitality from any ordinary irritating influence, as the result of nerve-disease?

THE ERUPTION IN LEPROSY.

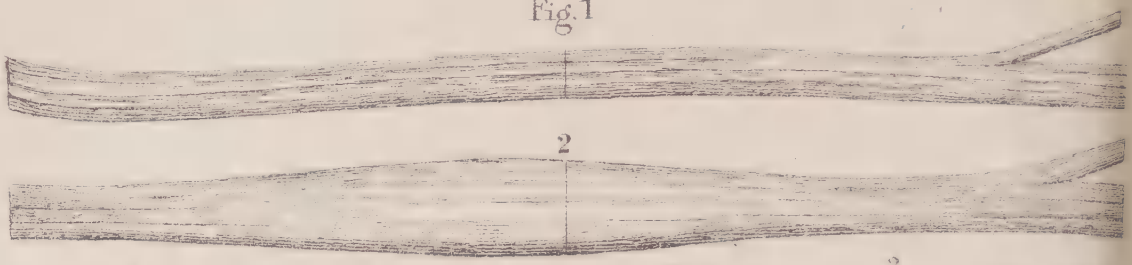
CASE OF TAH MUHAMMED, P. 6.

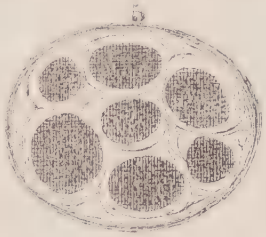
Carter, del.

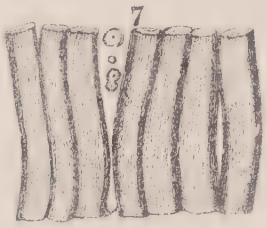
B.E.S. Press.

THE MORBID ANATOMY OF LEPROSY.—NERVES AND SKIN.

Fig. 1







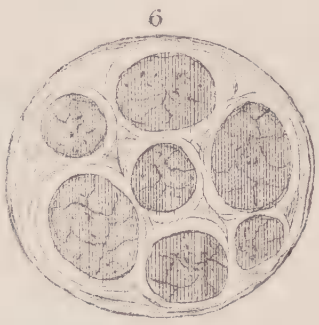
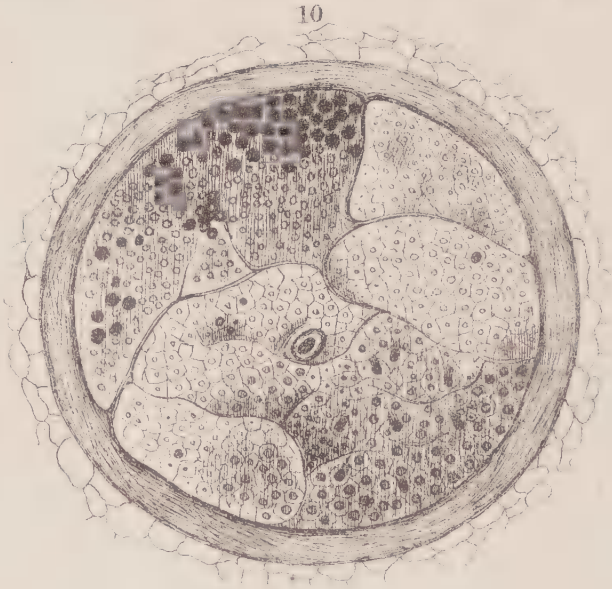


Fig. 12.



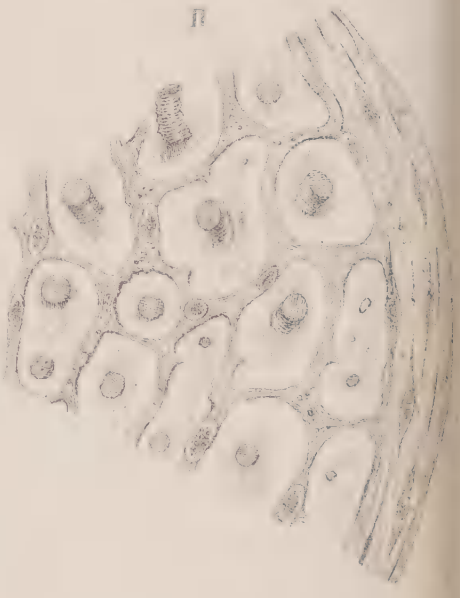


Fig. 13.

Fig. 14.

DESCRIPTION OF PLATE 2.

Figure 1. A portion of a healthy Ulnar nerve, natural size, $\frac{1}{7}$ in. in diameter.

2. A part of a diseased Ulnar nerve, natural size $\frac{3}{10}$ in. in diameter.

3. Part of a healthy Median nerve, at the wrist, natural size.

4. A diseased Median nerve, natural size: this figure shows an unusually abrupt form of swelling.

5. Transverse section of the healthy Ulnar, made where the line is seen in figure 1. Magnified.

6. Transverse section of the diseased Ulnar, made where the line is seen in figure 2. Equally magnified. The character of the enlargement is here seen, the funiculi alone being affected and not the nerve sheath.

7. Nerve-tubules from a healthy nerve; they are of uniform diameter, and in close apposition, no matrix being apparent in this specimen.

8. Vertical section of a diseased nerve-funiculus, showing the tubules widely separated, compressed and atrophied: their diameter reduced and irregular; their surface much corrugated. The morbid inter-tubular deposit is fibrillated, and contains elongated, granular nuclei. +acetic dil.

9. A portion of a diseased Supra-orbital nerve showing almost similar appearances, also a collection of small nuclei separating the fibres, round and slightly granular. This is a variety of the ordinary deposit. +ac.

10. Transverse section of a single funiculus from a much diseased Median nerve + acetic +Glycerine—1 in. object glass. The entire diameter is about $\frac{1}{20}$ in. This figure is intended to show that disease of a nerve may be limited to certain nerve-tubules only; in it the darker parts are the sound or least affected, and the black points indicate the extremities of nerve-tubules as yet but little changed; the lighter parts are the most diseased, and here the naturally opaque tubules, the remains of which the dots indicate, are replaced by a clear refractile material: there is also well seen the defined unaltered fibrous neurilemma or sheath of the funiculus, with the septa passing from it which divide the area into limited segments, each composed of a fasciculus of nerve-tubules; near the centre is the aperture of a blood-vessel, and outside the neurilemma, the connective tissue (acted upon by the acetic acid) which envelopes and binds the funiculi together, this contains fat-cells and vessels which are not here shown. Indistinctly marked in this view is the mapping out of the diseased area by nucleated fibres, as displayed in figure 11. So completely is the new deposit limited to the funiculi that these, after the action of spirit, readily drop out of their sheath, on manipulation, being firm and translucent, while the latter is comparatively unchanged.

11. A portion of a diseased funiculus more highly magnified, from a similar specimen to the last. Here several nerve-tubules are seen, compressed and otherwise changed, as imbedded in the clear morbid deposit around them; the nucleated fibres developed in the latter, are shown surrounding one or more tubules, and connected externally with the neurilemma, a part of which is also seen: the area of the spaces thus mapped out varies exceedingly; finally the nerve-tubules altogether disappear, and the clear deposit is probably wholly converted into fibrous tissue.

12. An enlarged Pacinian corpuscle, from the hand. The opaque granular and nucleated deposit in the interior is clearly seen, the tortuous tube in the midst is probably a blood-vessel, although in some instances it rather resembled a nerve-tubule.

13. A vertical section of the skin of the cheek, slightly magnified. It was made over a smooth shining livid swelling, and it displays the position of the morbid deposit to which this is due. The surface of the skin is smooth, free from papillæ, and slightly convex; the apertures of some hair-follicles are seen; the cuticle is thin, the cutis and subjacent tissue are the seat of a firm, reddish, semi-translucent deposit, disposed in lobular masses and enveloping the glands, hair-follicles, &c. of the skin; beneath connective and adipose tissues are seen. The sebaceous glands belonging to the hair-follicles were in this specimen atrophied and compressed: I have seen them also distended; and the hairs are slender.

14. Minute structure of the deposit in the skin and mucous membranes. A coarse, obscurely striated matrix in which are imbedded numerous irregular granular masses and nuclei: the former are of considerable size (sometimes $\frac{1}{450}$ in. in length) and of irregular branching or stellate form; the latter round or oval and measuring from $\frac{1}{1000}$ to $\frac{1}{2000}$ in. in diameter. Many varieties in appearance are to be seen which it is needless to figure, but the general characters of the deposit are as here shown.

THE BONES IN LEPROSY.

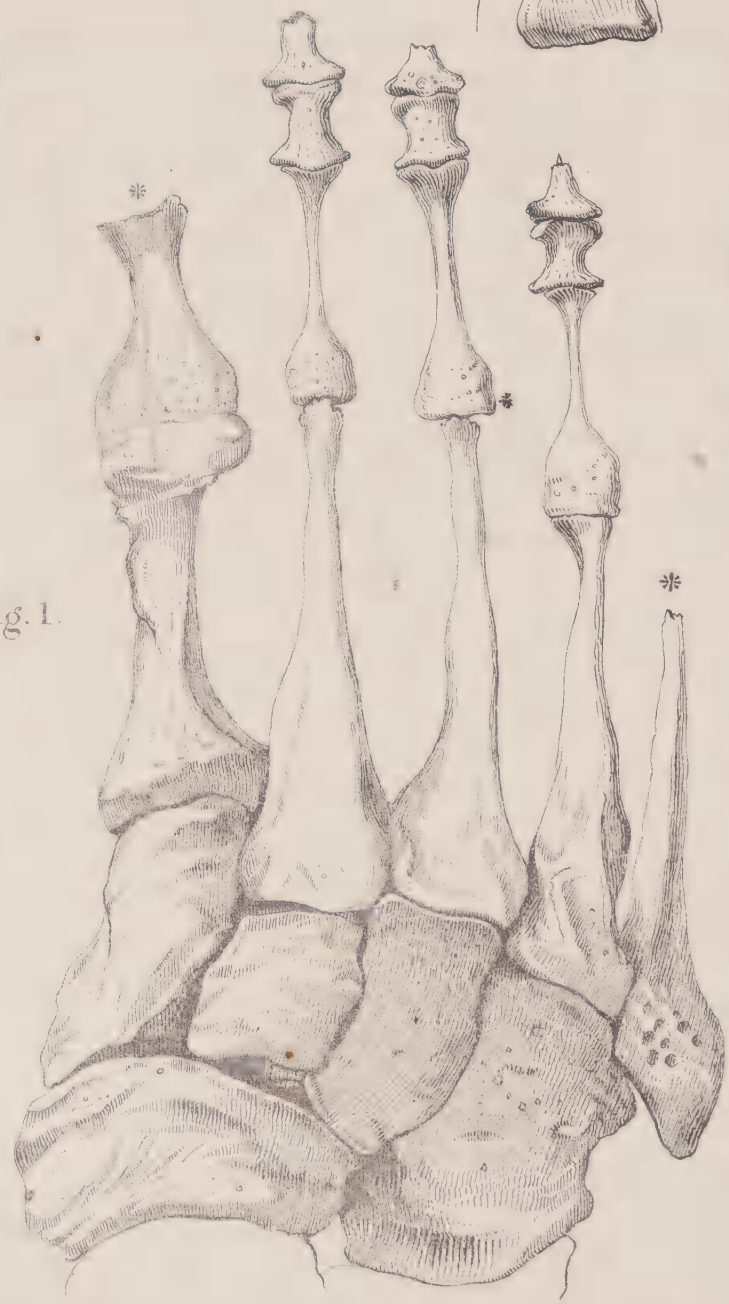


Fig. 1.

DESCRIPTION OF PLATE 3.

Figure 1. A view of the bones of the right foot taken from a specimen in the Grant College Museum (A. 102). The segments of the *tarsus* are light and delicate in texture. The *metatarsal* row is greatly affected, each piece being attenuated towards the anterior extremity, so as to become more or less pointed; the head is wanting; the base is unchanged. The *first phalangeal* row is also characteristically altered, the shafts being converted into slender columns upon which the heads are seated like small expanded capitals; at * * these and the following segments are absent, probably by accident. The *second* row of phalanges are much less changed, but there is a perceptible thinning of the shaft: in the *terminal* row the expanded horse-shoe shaped ends of the little bones are wanting; the bases little changed. This and the following figures are of natural size.

2. A separate metatarsal bone from another foot, seen from above; it shows the tapering pointed form of the partly absorbed shaft, the anterior part and the head being deficient; the base unaffected.

3. The metatarsal bone of the great toe, seen from above; here the base alone remains like a conical stump, of which the apex is everted.

4. A side view of another first metatarsal showing the same malformation. Another specimen is mislaid which had a still more regular conical shape, exactly resembling a limpet-shell.

5. The bones of a shortened and bent middle finger: the remains of the wasted 2nd phalanx is anchylosed to the altered head of the 1st.

6. The remains of a segment of the 2nd phalangeal row: here absorption has proceeded to an extreme degree.

7. A similar specimen in which the shaft still remains as a slender, slightly incurved column.

8. The three segments of a shortened finger: the changes are characteristic in the terminal phalanx where absorption has proceeded to the greatest extent; destruction of the joint between the 1st and 2nd row of phalanges had occurred, as the result of inflammation, &c. and the adjoining portions of bone were separated in small necrosed fragments.

9. Another finger less distorted, but affected in a similar way to the last. These two specimens show the simultaneous occurrence of the two methods of destruction, viz. interstitial absorption and necrosis, the latter occurring at the articulations, being accompanied by swelling, &c. and leading to sinuses on the dorsal surface where the fragments are extruded.

DELIRIUM TREMENS IN THE EUROPEAN GENERAL HOSPITAL, BOMBAY, DURING THE FIVE YEARS 1857—1861.

By A. H. LEITH, M.D., Deputy Inspector General of Hospitals.

Presented October 1862.

Having arranged the copious notes that I took in the cases of Delirium Tremens admitted during the time I had charge of the European General Hospital, I offer the results to the Society as an addition to the annals of this disease which it already possesses in its Transactions, derived from the same field of observation.

The period during which the cases now analyzed were admitted extended from 1st January 1857 to the 9th January 1862, or a few days beyond five years. It is here necessary to explain that my definition of the disease is more restricted than that of Blake, which has been adopted by many writers, and which has been previously followed in the Hospital, and according to which many had Delirium tremens who did not advance beyond the first of his three stages, and who consequently never manifested any delirium. As stated in a former communication, I class under Delirium tremens only such as evince waking illusions or hallucinations; and those who, from the effects of drinking are merely tremulous and sleepless, or if trying to sleep, are startled by fearful dreams, I put under the heading "Ebrietas."

It was only in the wards under my own immediate care, that at the beginning of the period this distinction was made, and in consequence there was a considerable number of cases registered under Delirium tremens, as had been usual, in which but the indications of its approach were seen. When, however, my atten-

tion was more particularly given to the diaries of this disease through references from Dr. Morehead, I discovered the discrepancy in the classification; and as my colleague then most readily entered into my views and adopted the same diagnostic signs as myself, the entries in the Register became more uniform, and, I may add, the treatment became assimilated.

The following table is made after careful examination of all the diaries of the cases that could be found. Those in whose diaries illusions or hallucinations, or delusions are not recorded, are transferred to Ebrietas: they are thirty in number. Two cases of Mania wrongly entered are removed from this table. On the other hand, there are added to the admissions for Delirium tremens, two, who, from the hasty diagnosis required in rendering periodical Returns, were entered under Ebrietas, but in whom delirium was subsequently manifest; and seven cases in which the patients, although admitted for other ailments, were also treated for Delirium tremens, but were not transferred to that heading in the Hospital Register. Cases registered as Delirium tremens of which the diaries are missing, are retained as such—they are ten in number.

Differences in the definition of a disease are a bar to profitable comparisons in medical statistics; and it seems to me that it would be an advantage as regards the statistics of this disease, were the name given only when, what is commonly called its 2nd stage, has begun, as the diagnosis of this stage can always be more exact than that of the premonitory stage. As, however, the nosological definitions of Blake have hitherto been largely prevalent, it is advisable I should show the admissions for Ebrietas along with those for Delirium tremens, as has been done by Dr. J. Macpherson in his statistics of this disease in the Indian Annals of Medical Science, and the desirableness of which has been forcibly shown by Dr. Stovell in his elaborate and comprehensive paper on the statistics of the European General Hospital for the decennium, 1846-56, printed in No. 3 of the Society's Transactions.

Admissions and Deaths, corrected from the Diaries of Cases.

	Delirium tremens.												Ebrietas.												Delirium tremens and Ebrietas.											
	1857		1858		1859		1860		1861		Five years.		1857		1858		1859		1860		1861		Five years.		1857		1858		1859		1860		1861		Five years.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
January	7	..	6	..	6	..	6	..	3	..	28	..	10	1	13	..	4	..	14	1	7	..	48	2	17	1	19	..	10	..	20	1	10	..	76	2
February	2	..	1	..	3	..	3	..	6	..	15	..	11	..	5	..	12	..	5	..	10	..	43	..	13	..	6	..	15	..	8	..	16	..	58	..
March	2	..	2	..	6	..	3	..	6	..	19	..	15	..	8	..	3	..	23	1	10	..	59	1	17	..	10	..	9	..	26	1	16	..	78	1
April	7	2	6	1	1	..	..	..	3	1	17	4	11	..	10	..	7	..	8	..	13	..	49	..	18	2	16	1	8	..	8	..	16	1	66	4
May	1	..	2	..	2	..	3	..	2	..	10	..	17	1	18	..	15	1	7	..	10	..	67	2	18	1	20	..	17	1	10	..	12	..	77	2
June	5	..	2	..	3	..	4	..	1	..	15	..	10	..	26	..	7	..	11	..	6	..	60	..	15	..	28	..	10	..	15	..	7	..	75	..
July	3	..	..	..	4	1	2	1	3	..	12	2	8	..	10	..	8	..	4	..	5	..	35	..	11	..	10	..	12	1	6	1	8	..	47	2
August	..	..	8	..	3	..	3	..	2	..	16	..	7	..	10	..	10	..	7	..	5	..	39	..	7	..	18	..	13	..	10	..	7	..	55	..
September	2	..	3	..	5	1	3	..	5	..	18	1	12	..	8	..	8	1	5	..	6	..	39	1	14	..	11	..	13	2	8	..	11	..	57	2
October	8	1	2	..	4	..	4	..	2	..	20	1	5	..	15	..	4	..	7	..	7	..	38	..	13	1	17	..	8	..	11	..	9	..	58	1
November	8	1	4	..	..	..	5	..	1	..	18	1	13	..	15	..	4	..	4	..	4	..	40	..	21	1	19	..	4	..	9	..	5	..	58	1
December	4	1	2	..	7	..	4	..	3	..	20	2	13	..	11	..	6	..	11	..	4	..	45	..	17	1	13	1	13	..	15	..	7	..	65	2
1st Week 1862	..	..	..	1	..	..	..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	2	..	2	..
Admitted	49		38		44		40		39		210		132		149		88		106		87		562		181		187		132		146		126		772	
Died		5		2		2		1		1		11		2		..		2		2		..		6		7		2		4		3		1		17

NOTE.—Two admissions in January 1862 are added to the sum of 1861. The deaths under Delirium tremens are here entered according to the dates of admission.

From this table it is calculated that the ratio of mortality on the admissions in the five years was, from Delirium tremens 5·24 per cent.; from Ebrietas 1·07 per cent.; and from Delirium tremens and Ebrietas, together, 2·20 per cent.

In the first year, that is 1857, the mortality from Delirium tremens was twice as high as it was in any subsequent year, amounting to 10·2; the mortality of the other four years, taken together, was 3·7, and in the last two, that is, 1860 and 1861, it was 2·5 on the admissions.

The uncorrected table which I have before me, but with which I do not encumber this paper, shows for the five years, of Delirium tremens 233 admissions and 12 deaths, or 5·15 per cent.; of Ebrietas 534 admissions and five deaths, or 0·94 per cent.; and of both together, 767 admissions and 17 deaths, or 2·23 per cent.

I endeavoured to arrange all the cases in two classes, according to the definitions of the two recognised species, but I had to relinquish the attempt owing to the large number that were on the border line, and from there being a considerable number that, in running their course, passed from one form to the other. There were many, however, that were illustrative of the two species of the disease, and the majority of the deaths were of the first species or that which follows a debauch, more or less prolonged, and is attended with vascular excitement. The result of a tentative classification of 117 cases was, that 97 could be referred to the second species, 11 to the first species, and 9 were too doubtful to allow of their being referred to either category.

From the table, the influence of *season* on the admissions is not apparent, but the bad effects of Christmas festivities is seen in the numerous admissions in January.

The sufferers were of the following *occupations*:—

Seamen	67
Ship Masters' mates, Pilots, Preventive Officers, Mail Agent.	17
Military Pensioners	23
Warrant and Non-Commissioned Officers and Soldiers	17

Steam-ship Engineers and Boiler-makers, Plate layers	19
Engine-drivers, Fire-men, and Railway Guards	10
Civil Engineers	2
Press-readers, Compositors, Reporters, &c.	6
Schoolmasters	3
Groom, Jockey, Farrier, Circus Clown	7
Coach-builder, Carpenter, Painter, Saddler	6
Railway Sub-Contractor, Overseers	4
Merchants.....	2
Turn Cock, Warder of Prison	2
Tavern-keeper	1
Telegraph Signaller, Station-master	2
Clerks	10
Women	12

The large preponderance of Seamen is owing to the circumstance that the majority of the patients treated in the Hospital were of that class. The female admissions for this disease were in nearly the same proportion to the male, that they were from all causes, the number of women received into the Hospital being small.

The mean age for the five years was 36·2 years, while that of the patients generally as I ascertained for the year 1857-8, was but 28·7. Arranged in periods, the ages of 209 were as follows,—the age of one is not at hand.

18	years	in	cases	1	41 to 45	years in	cases 28
22 to 25	„		„	7	46 „ 50	„	„ 21
26 „ 30	„		„	56	51 „ 52	„	„ 5
31 „ 35	„		„	45	59	„	„ 1
36 „ 40	„		„	44	61	„	„ 1

Of the fatal cases four occurred between the ages 26 and 30, five between 31 and 35, and two between 36 and 40 years.

The *liquors* which the patients had been drinking were noted in 84 instances, with a view to discover whether the character of the disease was in any way modified or affected by the kind of liquor taken, but neither in the severity nor the duration,

nor in the character of the delirium, nor in the tendency to convulsions, was there anything assignable to any particular kind. It was the alcohol that was the pernicious agent, and to the quantity of it taken, was to be attributed the disease in all its phases: there were no grounds for the idea often cherished by those who have a sympathy with the drunkard, that it is the bad, the drugged liquor that does one harm.

The kind of Liquor drunk.

Brandy alone	by	36	Brandy and Country Liquor	by	1
Gin or Old Tom	,,	4	Gin and Rum	,,	1
Country Liquor	,,	10	Wine and Beer	,,	1
Brandy and Gin	,,	8	Brandy, Gin, and Arrack	,,	2
Brandy and Beer	,,	8	Brandy, Gin, and Whisky	,,	1
Brandy and Arrack	,,	2	Brandy, Wine, and Beer	,,	1
Brandy and Wine	,,	2	"Mixed," "All kinds"	,,	7

The *accession* of delirium with reference to the lapse of time since the last taking of liquor was noted in 189 instances. In 113 cases delirium began while still drinking, and in the other 76 the mean interval between potation and delirium was 45 hours, it was—

24			hours in	24	cases.
25 to	48	,,	,,	24	,,
49 to	72	,,	,,	18	,,
73 to	96	,,	,,	10	,,

From time to time it occurred that after the hallucinations had lessened or apparently passed off, and perhaps after having had an hour or two of broken sleep, the patient suddenly had a return or exacerbation of delirium. Such relapse having attracted my attention, I was more careful to note future cases; these, along with what were already recorded, form a list of twenty-three, and the list would doubtless have been more copious had the daily entries in the diaries been as full at the beginning of the years, as they subsequently were: the following is an example of the *secondary* or *relapse* cases:—

Case of ———, Railway Plate-layer, aged 29 years. In India 2 years, admitted 6¾ A.M. 17th Sept. 1861. Says he has been drinking hard and for four or five days has eaten nothing, but has still been drinking: latterly he has had irritability of stomach. Says he has not slept for four nights. Has hallucinations of persons being present and speaking to him. Surface is warm and moist: pulse in recumbent posture, 90; tongue foul; bowels regular; has no headache: has no inordinate heat of head. Smells of alcohol and he says he drank some spirits this morning before admission. Is tremulous: diameter of the pupil between ¼th and ⅖th of the diameter of the clear cornea.

Besides his usual meals with meat at dinner, to have broth every 4 hours.

Vespere. Vomited after midday. Is very tremulous: has some heat of head; bowels have acted twice.

Cold affusion to the head.

18th. Has not slept; has dizziness on shutting his eyes; still has hallucinations of vision. Pulse in recumbent posture 84, soft. Surface moist; no inordinate heat of head; no vomiting. On standing is very tremulous and unsteady; pupil ⅖th.

Vespere. Had some heat of head about 1 P.M. and cold affusion was used; says he does not feel so well since then and has some occipital headache. Still has fancies of people talking to him. Converses rationally.

19th. Slept a little last evening, but at 10 P.M. started up screaming and crying "Murder." He was violent and noisy in the night, but since day-light he has been less so. Is occupied with delusions, and fancies animals are about him: he points to them on the floor. Pulse in the recumbent posture is 120. Surface is warm and moist. Is very tremulous. Bowels were open yesterday. Pupil between ⅜th and ⅔th.

Vespere. After the morning visit he tried to destroy himself by dashing his head against his iron cot, he has severe contusions on his face. He said, on being questioned, that he thought that all were dead and that he wished to die also. Since then, an attendant has been in the room with him, inducing him to keep lying down, and he has been tractable. Delirium continues, and he is under delusions as to all things around him, and has hallucinations of vision and hearing. Surface moist and of moderate warmth. Pulse in recumbent posture 96, soft.

Cold wet cloths to the head.

20th. No sleep. Is fully occupied with his delusions and hallucinations. Is tractable and does what he is told to do. Surface of moderate heat; has had thirst; takes food; pulse 90; pupil ⅗th.

Continue.

Vespere. Delusions fully occupy him. Pulse 110.

21st. Last night became violent, there was increased heat of surface. Cold affusion was used to the head. Has not slept; pulse 110; surface of moderate warmth and moist; delusions fully occupy his mind; is tremulous; takes his food. Bowels have not acted for 3 days.

Continue.

Vespere (4 P.M). Fell asleep at 1 P.M. and slept until now, when he has taken broth; seems still drowsy. Bowels acted naturally to-day.

22nd. Fell asleep at 7 P.M. and slept until 7 A.M., merely waking to take broth. Is now free from delirium. Pulse in recumbent posture 66; surface natural; pupil $\frac{2}{7}$th.

23rd. Slept some hours yesterday, and in the night three or four hours. Has had some headache since last evening. No return of delirium. Pulse in recumbent posture 60. Pupil between $\frac{1}{4}$th and $\frac{2}{7}$th. *To have mutton diet.*

September 28th.—*Discharged.*

There were five instances of *secondary delirium* among the fatal cases, and in these it was of a violent character and ended shortly in convulsions. Violence, however, was not in the majority of all the cases a characteristic. I find that Jackson had noticed this phenomenon, and that he mentions it as the supervention of, what he calls, the true Delirium tremens (the 2nd species of others) on what he considers a totally different disease,—the *delirium a potu continuo.* My observations include cases of secondary delirium which may, without hesitation, be referred to the 1st species, and others which are equally well marked instances of the 2nd species; the greater number, however, were of the latter. Among the twenty-three observed cases there were three in which the primary delirium did not begin until after cessation from drinking for a mean interval of twenty-two hours, while in twenty it began while still drinking. The secondary delirium began after having left off drinking for a mean of 63 hours.

The state of the *Stomach* during delirium was noted in 179 cases, as to the presence or absence of vomiting. Of these, 112 had no vomiting, while 35 were admitted delirious with irritability of stomach, having been still drinking up to the time of admission. Out of 31 who were admitted not yet delirious but having irritability of stomach, two continned to vomit for a short time after delirium had begun: one of the two had *pneumonia.*

In one case admitted drunk, vomiting began on her becoming sober, and was still present for a short time after delirium had begun. In none was the vomiting persistent through the delirium. A case in which vomiting was produced by the *Mistura Antimonii cum opio*, and others in which it was caused by the medicines for concurrent disease, are not included in the above.

Out of 127 cases, the *Tongue* was clean and moist in 32; it was "furred," "dry," "white" in 67; it was "foul," "coated," or "brown" in 26, and in two instances it was "red" and "dry;" in one of these two last there was concurrent acute dysentery; in the other, the patient had been under opiate treatment for the delirium before admission. No particular state of the tongue exclusively pertained either to those cases that might clearly be referred to the 1st, or to those belonging to the 2nd, species.

The *Bowels* were mentioned as constipated in 24, but few of these required aperient medicine, as spontaneous action soon took place. There were 33 in which the bowels were noted as loose; this number includes those suffering from dysentery: some who had diarrhœa got medicine to check it, but in others the looseness ceased spontaneously.

The state of the *Skin* was recorded in 144; and among these it was of natural temperature, or cool, and more or less moist in 118: in some of these the perspiration was profuse. In 6 the surface was chilly, while in 20 it was hot; and in the last number were six of the fatal cases.

Of 121 cases there were 45 who had disproportionate *heat of head*, and 76 who were free from it. It was observed that some in whom there was no disproportionate heat at the beginning of the attack; it became observable when the sleeplessness and delirium were much prolonged.

Particular inquiry was in most cases made as to the presence or absence of *Headache*, but the result was not satisfactory, as during delirium the patients' answers are not to be depended on, and a leading question is too likely to bring an affirmative answer. In but two was severe headache spontaneously complained

of, and in both it was so after convulsions at the beginning of an attack of the 1st species: in one of these there was the secondary delirium or relapse, and during this headache seemed to be absent. Of the 30 in which headache was said to be present, it was referred to the forehead in 20; to the temples in 4; to the occiput in 5; to the vertex in 1; and in 4 its seat was undescribed.

Redness of the Conjunctiva was present in some whose other symptoms indicated the 1st species; and in many, who might be included under the 2nd species, it became manifest after several days and nights of sleeplessness, and might reasonably be ascribed to the unusually long exposure of the eye to the air, through wakefulness.

In observing the *Pulse* in any disease, it is of importance to take into account whether the observation is made while the patient is standing, sitting, or lying; and in this disease which is so often attended with debility, it is particularly needful to guard against error from inattention to the position of the patient. Another possible source of error is the effect that mental perturbation may have on the circulation; and a third is the recent muscular exertion that may have just been made: this has been noticed by Dr. Morehead. The observations recorded here were mostly made when the patients were recumbent; some of them however were in the sitting posture. Observations made while the patients were standing are considered as exceptional, and are not included in the following table.

Pulse, as noted in 150 *Cases.*

Under 70	in a minute	in	5	Cases
70 to 79	„	„	25	„
80 „ 89	„	„	40	„
90 „ 99	„	„	45	„
100 „ 109	„	„	14	„
110 „ 119	„	„	9	„
120 „ 129	„	„	10	„
130 and over	„	„	2	„

Of the two at 130 and upwards, one had chronic heart disease and recovered, the other died. In another fatal case the pulse was 120. In the rest of the fatal cases in which a satisfactory record of the pulse is preserved, it was, before the fatal convulsions began, from 92 to 98 in six, and in one who had convulsions from the hour of admission, the pulse did not rise above 72 in the intermissions of the convulsions.

Tremor was generally present, and in some it was so severe that the patient could not walk unsupported, and his pulse at the wrist could not be counted; in many, however, it was very slight, and in a few it was not observable.

Convulsions indicate very great imminent danger; and with the exception of one, whose primary disease was dysentery, and who sank exhausted under its severity, all the fatal cases, that is, ten out of eleven, ended in convulsions, or convulsions succeeded by coma. The attack was often without premonition; at other times it was ushered in by muscular twitchings; and some complained of an indescribable sensation in the head before the fit. Among the recovered cases there were ten who had convulsions.

Sleeplessness was a constant concomitant of the disease and it usually preceded it, and the only cases in which it was not clear that it did so, were those in which the persons continued to get drunk until admission; and among these a patient told me that it was many nights since he had slept, excepting in the insensibility of drunkenness. Sleeplessness is not strictly a diagnostic sign of delirium tremens, because it is often present in mania, but where it is absent or when after sound sleep, delusions and hallucinations continue, there is strong reason to conclude that the disease is mania, or that it is passing into it, as after repeated attacks delirium tremens is not unlikely to do.

The *Delirium* varied much in character and degree. Its precursors, in those cases that came early under observation, were vivid dreams. The mental representations which were

as yet repressed in broad day-light, and corrected by the realities of perception, recurred with startling effect in the night, or when the eyes were closed in approaching sleep. They soon came in twilight to be mixed up with surrounding indistinctly visible objects, and the disease still advancing, the pictures of the mind became so vivid that even in day-light they combined with objects of sense to form *illusions*. If still progressing, purely subjective pictures of the mind or *hallucinations* rose up uncorrected by the perceptions; in some, especially the experienced drunkard, the judgment still disallowed their reality. Yet further advancing, these visions became more life-like, while erroneous fancies or *delusions* came to possess the mind, and the judgment no longer refused to accept them as realities. The patient was now more influenced by his hallucinations than by the words of his attendants; and at a still more advanced stage of the delirium, the power of attention was in abeyance, and the mental visions and memories passed unarrested and in such rapid succession, that his articulation could not keep pace with them, and although the chain of the ideas that passed through his mind may have been perfect, his utterances were altogether disjointed and incoherent: or the ideas flowed in rapid succession with no exercise of the attention to arrest them; and the only indication of volition was an incoherent muttering now and then. Thus attention and volition ceased to be exercised to the same degree that they have ceased where in sleep the dreamer mutters, yet here sleep was absent. Sleep indeed was what would have restored the deranged mind. We have still to ask the Psychologist the question—What is sleep? for sleep may be present when imagination is active, as in dreaming, and sleep may be absent when volition and attention are in abeyance.

The *delusions* were usually of a distressing nature, such as conspiracies to defame, ruin or murder, and the hallucinations, which were most frequently those of sight, were generally of a hideous or frightful kind, but not always so. The most common of these were wild beasts and persons with deadly

weapons and Satanic figures lying in wait, or in pursuit, or reptiles crawling about the room: sometimes the delusions and hallucinations were of a different character, as for instance, a patient fancying himself in the company of his drinking companions, put out his hand to snatch the glass which he saw one of them offer, and on its still eluding his grasp after several attempts to take it, he became enraged at being thus mocked by him. This was no mere illusion, but a pure hallucination, as he was in bright day-light, sitting with his eyes directed to the clean, whitewashed wall of his room, when he pointed to his fancied tormentor. Visions of blood were not uncommon: two men fancied blood was dropping from the points of their fingers, and one saw it dropping from an imaginary knife. The phantom figures were by some seen in their natural colours, by others as black, by others white, and by a few as red. Their size was often diminutive; and one man who saw flights of small white angels, said, as he continued to look at them, that they became larger. Next to sight, hearing was the perception most subject to illusion and hallucination, ordinary noises being perceived as articulate sounds, and the voices of unseen persons being heard when no real sounds were perceptible. A combination of the hallucinations of sight and hearing was rare, but sometimes a patient talked as if receiving answers from one with whom he fancied he was in conversation, and at whom he was gazing. One of the few whose delusions were hilarious and whose hallucinations were amusing, after seeing Lilliputian figures moving about the room, saw a cock stand in the middle of the floor and heard it repeat the multiplication table.

Hallucinations of smell were not observed, and those of taste but rarely so. Hallucinations of touch were not uncommon, and with these may be included the searching in the mouth with the tongue, for something fancied to be in it, which it was wished to spit out. A man was noticed going through the movements of smoking with his lips and cheeks, while with his hand he held the imaginary pipe to his mouth. Another, for a long time opposite the smooth wall of his room worked with his hands

and feet, fancying he was ascending a ladder, and complained of not being able to get to the top, and of being fatigued with the weary length of it. The pricking of imaginary darts and arrows was not an infrequent hallucination. Hallucinations of common sensation also were observed, the delirious man fancying he had been cut in pieces or had undergone a surgical operation, and scarcely being re-assured when induced to pass his hands over his body or limbs. One went through the movements of collecting fuel and lighting a fire and warming his hands at it, with seeming satisfaction. Illusions were sometimes occasioned by concurrent organic disease;—a man suffering from pneumonia, fancying he was walking in the street, complained that passers-by were constantly jostling him. Another with acute hepatitis declared that he had just been stabbed. In one case there was hyperæsthesia of the whole integument, rendering the least touch painful.

Vertigo was often observed to be present: more than one patient, while lying down, grasped the sides of his cot, fancying that it was being tilted up to throw him off. Others fancied they were in a boat on a rough sea, and "held on" to steady themselves; one thought he was on a sea voyage for the recovery of his health.

Delusions or erroneous fancies were seldom unattended with illusions or hallucinations of perception, and when they were so, there was reason to fear the disease was verging into mania. During the five years two confirmed drunkards who had been repeatedly under treatment for delirium tremens, became at length inmates of the Lunatic Asylum.

In their delirium many were noisy who were not violent, their terror being the cause; but others were extremely violent and intractable, offering violence to themselves or others; and although the greater number of these may be included under the first species, there were others who could only be classed in the second, their violence being perhaps attributable to their natural or habitual temper. Of 193 cases in which the point was noted, there were 47 violent and 146 not so.

Among this class of sick there are some who, without sense of shame, tear off their clothes; and others who are devoid of all regard for propriety or cleanliness in answering the calls of nature: such instances, however, are less frequent than among maniacal patients.

If sound sleep ensues, the delirium is found to be gone when the patient wakes, or if the sleep be short, he is more rational than he was before it, except in those cases of secondary delirium before mentioned. In some cases the delirium progresses to the degree of incoherence and loss of attention, and then gradually lessens,—the power of attention returning before sleep begins.

The mean *duration of delirium* in 124 recovered cases, was 82 hours. In 65 of these in which delirium began while still drinking, the mean duration was 99 hours; while in 59, in whom delirium began after having ceased to drink, the duration of it was but 63 hours,—the difference being 36 hours. These additional hours that in the former group were passed in delirium, approximate, although not closely, to the usual time (45 hours) passed between the last potation and the beginning of delirium and may be viewed as its equivalent; and perhaps, if the cases had been made out with more minuteness, the supervention of a secondary delirium upon that which began during drinking, would have been found to be far from uncommon.

In the 124 cases the duration of delirium did not exceed

24	hours	in	11	120	hours	in	8
36	,,	,,	13	144	,,	,,	10
48	,,	,,	15	156	,,	,,	3
60	,,	,,	11	168	,,	,,	4
72	,,	,,	17	180	,,	,,	2
84	,,	,,	10	192	,,	,,	5
96	,,	,,	8	216	,,	,,	1
108	,,	,,	5	240	,,	,,	1

The condition of the *pupil of the eye* has been the subject of careful observation, especially during the last three years of the period under review. In my Hospital Report in No. V. of the Society's Transactions, I mentioned the sources of error

that render observations as they are usually made, useless for determining whether there is an abnormal state of the pupil in this disease. In the first year of my observations in the European General Hospital I did as others, and with patients whom I had never seen before, I noted the pupil as "dilated," "natural," "contracted," &c. without knowing what sizes of pupil were really natural to them, and without a thought of ascertaining this point after their recovery. I however became dissatisfied with this procedure, and finding that there was no absolute standard size in nature, and that each eye must be judged of by its own standard, I prepared the *mydriameter* which I described in the Report referred to. As the result of my observations with it, I stated that in Delirium tremens the pupil is abnormally large. From the iris remaining sensitive, the pupil may vary in size according to the amount of light to which the eye is exposed, but with a fixed amount of light it is larger during the delirium than it is with the same amount of light after recovery. Dr. Morehead in his admirable and valuable work on Diseases in India, does me the honour to refer to my observations, but unfortunately he gives too much weight to those of the first year, which I discard as worthless, while he suggests doubts of the accuracy of those I made with the aid of the mydriameter, from his not being aware of the improvement in the accommodation in the Hospital that had been made, and overlooking the precautions that I mentioned as being taken in observing.

To ensure accuracy in my recorded observations they were made at the morning visit, while the eyes were directed to the sky, *not to the observer*. The amount of light being thus uniform, and the patient having had no medicine, any difference between the size of the pupil during delirium and its size before delirium or after recovery from it, may with reason be attributed to the influence of the disease. By this procedure the absolute natural size of each pupil was not ascertained, for this is no fixed magnitude, but is ever varying with the amount of light, neither was the mean size obtained, as the light even of the

morning Western sky on which the window opened, was stronger than that which the eye usually meets among surrounding objects, but as the comparative size was what was sought, this amount of illumination was chosen as being more equable than any other at hand. As it is much more convenient to deal with fractions of the same denomination, I have latterly used decimal instead of vulgar fractions in the scale of the mydriameter.

As the iris is far from being sluggish during Delirium tremens, the effect of such medicines as usually influence it are readily manifested: thus, Quina in febrifuge doses has been found to increase the dilatation, and Opium even in quarter-grain doses at three hours' intervals, in the treatment of concurrent disease, has been seen to lessen the pupil, the effect remaining for some hours after the opiate has been discontinued. Alcohol as is well known, acts as a *mydriatic*, and in patients who have been drinking up to the hour of admission, the pupil will, it is likely, be affected by it, whether delirium has already begun or not, and some time must elapse before this effect of the last potation passes off. All these disturbing causes have been eliminated or taken into account in arranging the observations of which I have now to give the result. I have to add that the maximum dilatation observed during delirium in each case was that which was used in the calculations.

From the mean of observations in 106 patients, the diameter of the pupil was ·355 of the diameter of the clear cornea during delirium, and but ·248 of the diameter of the clear cornea after recovery; and as circles are to each other as the squares of their diameters, the area of the pupil was doubled during delirium, being as 100 to 49. Among these 106 cases there were 7 in which the pupil was the same after recovery as it was during delirium, but in none of them was it smaller during delirium, and in no other case was it observed to be so, except where opium had been taken.

In further analysing these observations on the pupil it is found that in 58 who were admitted delirious, and who had been

drinking up to the time of admission, the diameter of the pupil was during delirium ·355 of that of the clear cornea, and after recovery it was ·253, which, by the rule which makes circles to each other as the squares of their diameters, gives a ratio of 100 to 51. It is further found that in 32 cases in which delirium did not begin until 24 hours or more had elapsed after drinking had ceased, the mean diameters during and after delirium were respectively ·348 and ·233, which give areas of the ratio 100 to 45. Thus, in the former group, notwithstanding the mydriatic effect of the alcohol recently drunk, the delirium was less potential in dilating the pupil than the delirium in the latter group, in which it came on after a considerable interval.

In twelve only of the cases of secondary or relapse delirium was the size of the pupil noted; in two of these the pupil was smaller in the secondary than in the primary attack: in three it was the same in both, and in seven it was larger in the secondary than in the primary.

When convulsions threatened, the dilatation was great, and during the convulsions the iris was often nearly invisible. In some prolonged cases uninfluenced by alcoholic liquor or medicine, the pupil was observed to increase in size while the delirium advanced in severity, and to decrease when the delirium became less engrossing and when sleep approached. I give a case illustrative of this.

Case of ———, Engine-man, aged 35; in India 5 years. Admitted 9 A.M., 5th January 1860.

Says he had fever, and notwithstanding drank, and the last few days has taken nothing but drink, thinking it would steady him and enable him to continue at his work. The last two days he has vomited much; for some nights has not slept. He is very tremulous with, at times, convulsive movements of his arms. Surface warm; pulse in recumbent posture 96, full. Is timid and afraid to be left alone.

Since admission has slept 3 hours. Pupil was in diameter $\frac{1}{4}$ that of clear cornea.

Besides ordinary meals, Extra broth in the night.	*Cold affusion to the head, and cold wet cloths to the forehead.*

January 6th. No sleep; has been vomiting in the night; surface is cool; pulse less frequent. Tremor is still great.

Extra broth every 6 hours.

Vespere. Very tremulous: vomited a little this morning; has since then retained his food. Now he says he sees phantoms when he closes his eyes, so that he lies with them open, trying to escape from the visions. The hallucinations are confined to visions.

January 7th. Was delirious, talkative, and sleepless in the night. Now is under the delusion that there is a conspiracy to defame him and to rob and murder him. Pupil $\frac{1}{3}$rd.

Continue the broth. | Omit the cold affusion.

8th. Was noisy in his delirium until day-light. He fancies he was kicked through the streets in the night; and now, that grog has been put into his broth. Pulse 100 to 110 in both the recumbent and the sitting postures. Surface of natural warmth, moist. Is very tremulous. Pupil $\frac{2}{3}$th.

Vespere. Pulse 84: delirious fancies wholly occupy him.

9th. Slept not. Is delirious but quiet and tractable. Pulse 84: pupil $\frac{2}{3}$th

Vespere. No sleep: pulse in sitting posture 110; delirium continues.

10th. No sleep: is delirious and restless. Pulse, in sitting posture, 96; pupil $\frac{1}{4}$th.

11th. Fell asleep last evening, and has slept continuously until now, and is still asleep.

12th. Did not awake until 5 o'clock last evening, and then between 7 and 8 P.M. slept again, and is now asleep. There was no delirium when awake last evening.

Vespere. Awoke about 9 A.M. Has slept at intervals during the day.

14th. Has continued free from delirium; sleeping naturally; pupil between $\frac{1}{3}$th and $\frac{1}{4}$th.

To have mutton diet.

16th. Continues better: pupil between $\frac{1}{3}$th and $\frac{1}{4}$th.

To be removed from the single Ward, in which he has been, to the common Ward.

January 24th. *Discharged.*

The treatment was not uniform; but in the cases that were under my own immediate care, no medicine, as a general rule, was given, unless some concurrent disease seemed to call for it;

and as it happened that in none of these was opium in any form imperatively requisite, none was given by me. I was thus the better able to observe the natural course of the disease. The exceptions to this rule among the uncomplicated cases were two to whom some doses of aromatic Spirit of Ammonia were given with the broth, on account of alarming depression, and three others who had each an aperient to remove constipation. The following is one of the former :—

A Press-corrector, aged 35, born in India, admitted in the morning of 11th October 1860.

Said to have been drinking for two or three months; and for ten days to have been drinking very hard, said to have, during the last two days, had delirium. Drank hard up to the 8th instant: on the 9th, took only one glass: it was to steady himself when going to the meeting of the Temperance Society to take the pledge. Says he has not slept for five nights, owing to fearful fancies. Now is stupid and does not readily comprehend when spoken to. Pulse 96 in recumbent posture, weak. Tongue, moist and clean. Head hot, and extremities chilly. Mouth compressed, and when he opens it, there is tremor or convulsive twitching of the jaw: no vomiting; pupil ⅓rd.

Cold affusion to the head and hot pediluvium. | *Sinapisms to the calves.*

Sago and strong broth with bread, alternately, every three hours.

October 12th. After the pediluvium yesterday he perspired freely and the inordinate heat of head went off. He was restless and delirious, speaking as if in conversation with some one he supposed to be present, and following imaginary objects about the room and striking at them. In broad day-light, with only a spotless, whitewashed wall before him, he hurt his knuckles striking with his fist at a phantom. At 1 P.M. he was exceedingly weak and exhausted with his exertions: the pulse at the wrist was barely perceptible, and the feet were chilly. His attention could not be commanded. As danger from exhaustion was imminent, he was not left alone in his room, but an intelligent person was placed beside him to prevent his getting into the erect posture, and this watch was kept up by reliefs until this morning. Sinapisms were applied to the soles of the feet, and Spiritus Ammoniæ Aromaticus was given in the broth, and thrice it was given in the intervals. In the night he became quieter and seemed inclined to doze. This morning is less weak and replies more rationally to questions, and the warmth of surface is equable and natural. Pupil between ⅔th and ⅓rd. Pulse, recumbent, 84 soft, weak. Tongue furred.

It is said that before admission he had bilious vomiting: there has been no irritability of stomach since coming to Hospital.

Vespere. No sleep. Has been talking to himself or to imaginary persons, and fancying objects on the wall. Says he has slept, although it is known that he has not: pulse 72, of better strength.

13th. Slept from 1 to 3 A.M., and a little between that time and 6 A.M., there was then very little remaining delirium. Since 6 A.M. has been sleeping soundly.

Vespere. Awoke at 3 P.M., and has been free from delirium.

October 14th. Slept from 9 P.M. to 6 A.M., when he was improperly wakened by an attendant. Bowels have acted twice, loosely: pupil $\frac{2}{7}$th.

To have milk diet. | *If again moved loosely to have Mist. Cretæ.*

October 15th. Did not require the medicine, had no return of looseness of bowels: slept well.

16th. Continues well. Pupil $\frac{2}{7}$th. *Discharged.*

In the treatment seclusion and as much quiet as could be commanded, were enforced. There was often at first a fear of being shut up alone, but it soon passed off. There were, however, exceptional cases, in which the dread, inspired by their delusions and hallucinations, was overpowering; and in such, an attendant was placed in the room with the patient, and also, as in the case last given, where a patient in a weak and exhausted state was over-exerting himself in moving after or struggling with phantoms, an attendant remained beside him to induce him by persuasion to keep to his bed, thus averting the probable accession of convulsions or collapse. It sometimes happened that the patient was so outrageously violent, that to prevent his self destruction, or his doing grievous injury to others, he was secured with sheets to his cot. This measure was used in one of the cases of attempted suicide; the man had, before admission, jumped into the sea from a boat, and after being brought to Hospital he tried to destroy himself by butting with his head against the wall, and wounded the scalp severely. This means of restraint was not resorted to by me except in like extreme necessity: the effect, where it was used, was generally salutary, as the patient, when he found himself to be powerless, ceased to struggle; but it is not without much ground

for apprehension of evil that this means can be used, lest the struggling should continue and induce convulsions.

The rooms for the treatment of the delirious were bad and ill-adapted for the purpose during the first part of the five years; but after representations of this being made, I had the satisfaction of having others erected; and from 1859 until the close of 1861 the accommodation was nearly all that could be desired, the chief remaining imperfection being that the rooms were not free from surrounding noises.

There were four sufficiently spacious rooms, well ventilated, and each lighted in the day-time from the western sky, by a window guarded with wire netting and above the reach of the patient, and at night lighted by a lamp, placed outside, through a thick pane of glass which was secured from violence. On the east side the door opened into an open verandah, and above it there was a venetian window, beyond reach; the iron cot was in the middle of the room with its head against the wall, and was firmly fixed, so that it could not be used to barricade the door, or to aid the inmate to reach the window. The floor was planked so that in cases, not rare, in which the patient could not be induced to lie on the cot, from fancying it was occupied by a corpse or some other frightful object, he might not suffer from cold, as he would have done, on a paved or plastered floor. The walls were white-washed and kept as free as possible from spots and marks which might favour illusions; and there was a securely fixed close-stool in one corner. There was an attendant day and night outside, who, through a peep-hole with a slide in the door, could watch the patient without disturbing him, if inclined to sleep, or exciting or irritating him, if restless. There was a shower and douche bath attached to these rooms. The means of self-injury were, so far as easily practicable, kept away from the sick: no strings, handkerchiefs, knives or forks were ever allowed in these rooms, yet the patients had to be watched to prevent their injuring themselves in the ways already described.

It is very needful that, whether in hospital or in private dwellings, the delirious sick should be removed from the opportunities of precipitating themselves from windows or balconies, which they will sometimes try to do, even when not intending self-destruction, but merely to escape from some terrific phantom or fancied danger. Two of the delirious patients were brought to hospital suffering from injuries thus received,—one of them had fracture of the femur and of the forearm. Another patient had been nearly drowned by jumping into the water to escape from fancied murderers.

When there was disproportionate heat of head, or when in robust men there was much excitement, either mental or vascular, cold affusion to the head was had recourse to; sometimes a hot pediluvium being at the same time used, or cold wet cloths were kept on the forehead. In the weakly, the injury that might ensue from the over-depressing effect of the cold applications was kept in view.

Sanguineous depletion by leeches was ordered in two of the patients on account of acute dysentery; in three who had fever with inordinate heat of head, a few were applied to the temples; and in two others, in whom there was no complication, and in whom there were convulsions, a few leeches were applied to the temples: one of these last recovered; in the other, the convulsions which had been accompanied with much flushing of face, intermitted for some hours, but then returned, and proved fatal. In former years I had experience of depletion among high-fed, robust, well-exercised men, in whom the disease was almost always from a debauch and not from long-continued tippling, and it was borne well by them and no untoward consequence followed. Now, from further observation I think, as a rule, depletion is unnecessary even in such cases: among habitual drunkards I deem it to be very hazardous.

Alimentation along with quiet I consider to be the most important part of the treatment of Delirium tremens, and this was carefully followed, except in the few who had pyrexia and much vascular excitement: in them the quiet only was sought. Irri-

tability of stomach, if present on admission, ceased now that alcoholic liquors were discontinued, and aliment was retained. Besides the ordinary hospital diet with meat at dinner, strong broth with bread was given day and night, every six, four, or even every three hours, or this was alternated with sago. In every case all alcoholic drink was at once stopped, and in no instance was this abrupt discontinuance of the accustomed stimulus to be regretted; on the contrary it was beneficial, because the stomach became retentive of food which it before loathed. It is besides of no small importance as regards the future welfare of the patient that no impression should be made or left on his mind that liquor had become necessary in his case. As an instance of the safety with which the habitual use of alcoholic liquor may be at once stopped, I give the following from my private notes of cases among another class of the community.

—— ——, aged 66 years. For many years habitually drinking largely of Sherry or Port-wine, but chiefly the former, and having already had three slight attacks of Delirium tremens, has lately been much fatigued by his official duties, and to enable him to get through them has taken largely of wine, while his appetite has failed. The quantity of wine drunk latterly has been a bottle and a-half or two bottles a day, and he besides has taken one or two glasses of brandy and water.

November 5th. This morning I found him in a very feeble state, extremely tremulous, so as to be scarcely able to stand, yet dressing to go to his office: this he was not permitted to do. His skin was perspiring and cool; he had not slept owing to horrid visions, and his eyes were red. The pulse could scarcely be counted on account of the tremor—it was about 72 in the sitting posture, and weak. He had griping of the bowels and slight diarrhœa: tongue was clean, and moist and tremulous. No vomiting, but had loathing of food. He smelt strongly of alcohol.

All alcoholic liquor to be discontinued.
To have his regular breakfast, meat-tiffin and dinner, and besides to have strong broth with bread, so that he shall take food every 3 hours, day and night.

November 6th. Yesterday would eat no meat, and with difficulty could take the broth; but now he is taking it more readily: dozed a little in the night but was disturbed by frightful dreams. Is very tremulous.

November 7th. The same nearly as yesterday, but less weak. Takes food willingly now, but still has great craving for wine.

November 8th. No sleep: fancied the room was full of people, and the furniture appeared to be persons. Tremor continues; pulse 84.

November 9th. Slept from 11 to 12 o'clock last night, but afterwards was very restless, and was occupied with hallucinations and delusions, and fancied he was to be tried for forgery: also that he was not in his own house but in the Lunatic Asylum. Has taken his food: pulse 96: says his head is confused, but is free from pain. Tremor great, surface of natural warmth. Bowels acted loosely this morning. Pupil in the diffused light of his room is between $\frac{1}{3}$th and $\frac{1}{2}$.

November 10th. Sleeplessness and delirium continue, and he is more fully occupied with his delusions; it was with difficulty he could be kept in bed last night: it is said there was slight increased warmth of surface. Fancies various criminal charges are brought against him, and he has the hallucination of seeing persons beside him, and among others one who has been long dead. Fancies he was out last night and that he did not return home until this morning. Addresses persons intimately known to him as others. Pulse in sitting posture 96, not very compressible. No heat of head; takes his food well; tremor is great; pupil between $\frac{1}{3}$th and $\frac{1}{2}$.

November 11th. Yesterday was stronger and was able to walk across his room. Delirium continued and he was less tractable than before. He took food with appetite. From half an hour after midnight he slept continuously until half-past nine this morning. Now speaks rationally, but he says that in his sleep he had a dream so vivid that it was like reality. Feels confused and appears sleepy. Pulse 96 in sitting posture. Still is tremulous, but says he feels much stronger, and he is able to walk without assistance. Diameter of the pupil, in the same light as that in which it was observed yesterday and on former occasions, is $\frac{1}{3}$rd of the diameter of the clear cornea.

November 12th. Slept yesterday from $10\frac{1}{2}$ A.M. to 2 P.M., and then after taking food he slept until 6 P.M.; after dinner he went to bed and slept soundly all night. Has had no return of delusions or hallucinations since yesterday morning. To-day feels well but a little giddy. Pulse in sitting posture 72. Pupil in the same light as yesterday's, between $\frac{1}{3}$th and $\frac{1}{2}$.

November 17th. Has continued well. Appetite is good. Strength has returned. Takes no wine or other alcoholic liquor.

Of the whole 210 cases, there were, without counting five who had merely an aperient dose or enema, 53 who had medicine; and there were 157 who had none. Of the 53 who had medicine, there were 27 to whom it was given on account of concurrent diseases, namely, six who for fever had small doses

of nitrate of potass and antimony, and one who had quinine. Nine had chalk, or chalk and catechu for diarrhœa. Two had ipecacuan and were leeched for dysentery. Eight had opiates for diarrhœa and dysentery; one had antimony for pneumonia, and one who had fracture took opium.

Of 26 who, without having concurrent disease took medicine during their delirium, two, as above mentioned, had ammonia on account of depression. Eight were treated with the mistura antimonii cum opio, formerly used in the Hospital; ten with draughts of chloric ether and carbonate of soda; one with chloric ether and ammonia; one with spirit of nitric ether and camphor. Besides these, two had chloroform inhalation. In two instances the mistura antimonii cum opio had to be discontinued, and camphor and ammonia to be given on account of depression; in one of these the depression was accompanied with vomiting and purging, which were treated with opium. In one of the two cases in which inhalation of chloroform was used, sleep was induced that terminated the delirium: in the other the remedy failed.

All the eleven who died were habitual drunkards: their cases may be divided into groups.

I. Three of them—A, P, and H, who, there is reason to believe, had been exposed to the sun, had pyrexia on admission, with little or no delirium; but in all three there was soon, along with exacerbation of fever, sudden, violent delirium, quickly followed by convulsions and death. All three on admission were treated on account of the fever with a saline refrigerant and antimonial mixture, and on accession of delirium, with cold wet cloths to the head. One had an ounce of leeches to the temples. It was in the bed of one of these, that after his death, a phial was found with the remains of laudanum he had been secretly taking.

II. Other three—T, S, and B, had convulsions on admission, which in one proved fatal in the course of the first

day: he had been delirious for two days, yet had continued to drink; there was flushing of the face, but no violence: an aperient, which he required, was given, and a few leeches were applied to the temples, as before mentioned. Another was treated with the mistura antimonii cum opio; and the third had merely cold applications to the head, and seclusion.

III. In four—N, F, A, and E, who, as the preceding, had continued drinking a longer or shorter time after delirium had begun, the common symptoms of the 2nd species of the disease were exhibited; all died from convulsions, or convulsions passing into coma. The treatment in one was with small doses of tincture of opium with carbonate of ammonia; in another with draughts of chloroform and ammonia; in a third a purgative and a saline and antimonial mixture; and in the fourth, cold applications to the head.

IV. In one, admitted in an advanced stage of dysentery, death was from exhaustion, without convulsions. He was treated with opium, ammonia, and brandy.

The duration of delirium in all the fatal cases could not be ascertained, as it had begun, in most of them, before coming to Hospital. The deaths took place within the following time from admission:—

In 16 and 18 hours		in	2
„ 25 and 46	„	„	2
„ 54 hours	„	„	2
Within 4 days		„	4
In 104 hours		„	1

The recorded appearances on examination after death were—

Groups.		Head.				Heart.	Lungs.	Lining of Stomach.	Intestine.		Liver.	Spleen.	Kidney.
		Meninges and Piamater.	Substance of Brain.	Quantity of serum.					Small.	Large.			
				Arach.	Ventricles.								
I.	A.	Turgid highly injected.	Normal.	Small.	.....	.....	Great congestion.	Morbidly injected.	.....	.....	.....	.....	.....
	P.	Full.	Vascular.	Serum.	Serum.	.....	Very great congestion.	Injected.	.....	.....	Right lobe mottled.	Large.	.....
	H.	Full.	Vascular.	Serum.	Serum.	.....	Weight 46oz.	Not noted.	Specks of ulceration.	Thick, not ulcerated.	.....	.....	.....
II.	T.	No Examination.											
	S.	No Examination.											
	B.	Congested.	Septum between ventricles wanting.	.....	Much.	.....	32oz. lower lobes congested.	Cardiac end mulberry coloured.	Duodenum vermilion.	Peyer's glands opaque.	Fatty, congested.	.....	Congested.
III.	N.	Deeply congested.	Vascular.	Distended.		.....	36 oz.	.....	.....	.....	Large, tough, not much congested.	.....	.....
	F.	Congested.	Vascular.	2oz.	Distended.	Hypertrophied.	.....	Very much congested.	Congested.	.....	Large, fatty, congested.	.....	Congested.
	A.	Deeply congested.	Vascular.	Serum.	.....	.....	.....	Congested partially.	.....	.....	Large, congested.	.....	Large.
	E.	Some fulness at base.	.....	oz. 2 or 3	None.	.....	Some tubercles.	Thick and soft.	.....	.....	Fatty.	.....	Congested.
IV.	G.	Congested.	Normal.	6oz.	Little.	.....	Normal.	.....	.....	.....	Congested.	.....	Degenerated.

In all these eleven there was more or less congestion of the piamater and meninges. In the greater number congestion was not observed in the cerebral substance, and the quantity of serum varied greatly and was not always in proportion to the time the patient had been *in articulo mortis.* The injected state of the stomach I do not attribute to the direct irritation of the alcohol that had been drunk, but from its being concomitant with deep congestion of more or less of the lungs, I consider it due to the state of the pneumogastric nerves in the particular mode of death. This I have mentioned in my Report for 1859-60, printed in the Society's Transactions, Volume for 1860, as observed also in other diseases, the congestion of the lung sometimes amounting to splenization, and the redness of the lining of the stomach, sometimes mulberry or claret colour, being generally confined to, or being markedly greatest at its cardiac end. The duodenum was also in some cases much injected. The condition of the liver was such in most of the cases as might be expected in habitual drunkards :—in three it was fatty, in one mottled, in two hypertrophied, and tough in one of these; and congestion was noted in four. The kidneys were congested in four instances, and in one they were degenerated.

Although an Hospital affords a good field for the observation of disease and for ascertaining the effects of particular courses of treatment, yet there are circumstances that tend to render Hospital statistics fallacious. In any large institution, open for the reception of all sick applicants, it cannot be but that some are brought in whom disease has run its course towards a fatal termination, and one must be distrustful of reports on dangerous diseases from such institutions, extending over years, in which, among many admissions, no such cases are shown. And as regards the treatment, the patient may, up to the hour of admission, have been under a totally different mode of it, from that ordinarily pursued in the Hospital to which he is brought; yet the result, whatever that may be, is attributed to the Hospital treatment; or, in the instance of Delirium tremens, a man

may for several days have been delirious, yet may have continued drinking hard up to the time of entering the Hospital, there to die in a few hours of convulsions; while, had he been admitted at the beginning of the disease, he would, in that institution, have been debarred from all spirituous liquors. Besides these sources of fallacy that have to be taken into account, there is one arising from uncertainty or differences of definition of diseases: of this, as applicable to Delirium tremens, I have already made mention, and I have endeavoured to obviate it in the examination of the present series of cases.

The mean time the patients were kept in Hospital was nine days, but that exceeded the mean duration of their treatment, because many being without friends in Bombay to care for them on their being discharged, it was considered necessary to detain them in Hospital, to keep them from being too soon exposed again to the temptations which they would meet in their lodging houses, or taverns.

REMARKS ON SANATORY SUBJECTS, WITH SPECIAL APPLICATION TO MAHABLESHWUR.

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Presented November 1862.

In the following remarks, it will occur to every one that an attempt is made to combine what is lofty on the one side, with what is mean and low, if not disgusting, on the other. Good taste, it may be thought, would have kept them apart. It has been judged desirable, however, to unite them, because they shed a mutual light on each other, and to obtain this good object, the venturous navigator has sought to steer his frail bark between the two narrowing whirlpools. The truth is, man presents himself to scrutiny in a two-fold aspect, and whoever would know and serve him well, must study him in both points of view. He is high and he is low. We must follow him, if we can, in his highest spheres of thought, feeling, and of action; nor must we shrink from observing him in his lowest depths. If we scan him in his highest manifestations, we shall fetch from the contemplation something useful for the business of life; if we survey him in his deepest descents, we may be sure that whatever pertains to him cannot be unimportant.

Man springs from the dust and returns to the dust. Man subsists by the use of the atmosphere,—of that substance, which is brine in the sea, vapour in the air, and becomes available as water for his use on the earth, which it reaches only to hurry off to the air or sea again, and of the lower animate and inanimate creatures of the animal and vegetable worlds. These last too came from the earth, and return again to the earth. We have not to do now with the beautiful order, constancy, and precision manifested in these sublime successions of events. We have to do with practical matters. What is a necessity of nature indi-

cates the duty of man. What man voluntarily or involuntarily takes from the earth, that he ought to return to the earth again. Man was taught this lesson also in the primitive commandment delivered to him in the infancy of the race, when it was ordained that he should live by the sweat of his face: that he should dress the earth and keep it. To dress the earth is obviously necessary, in any but the rudest state, that it may give food for man and the domestic animals. But that the earth should yield its increase, it is as necessary that it be kept, as it is imperative that it be dressed. The Hebrew word too, *Shamar*, it may be observed, corresponds with the double sense of the English word keep, not only to guard from external violence, but to conserve from internal loss or decay. To dress the earth is one branch of agriculture, and but one. Another branch, and one not less important, is to keep it. The modes in which the earth may be dressed are various; there is but one mode by which to keep it. This is, to return to it for assimilation with the soil, the waste and effete matters of organization, which vegetables, the food of animals and of man, have abstracted from it. To dress the earth will be vain, if a continual process of exhaustion go on without recourse being had to the necessary duty imposed on man to keep it. Thus, in such a case of negligence, the food of man in a country might cease to be produced, and a peopled, cultivated land become by ignorance, sloth, or unskilled cultivation, unproductive, and desolate. Before this consummation is reached, however, another result of mismanagement will follow. The effete waste of vegetable and animal life misused, misplaced, and neglected, left in accumulated masses on the surface of the earth, instead of being returned to its bosom, is slowly decomposed, and sheds newly formed gaseous products into the air, deleterious, and noxious to life; which, when they produce in their various degrees of concentration, various diseases and death, thin the population, and aggravate the evils of scanty and bad food.

Man's destination was to multiply and fill the earth, which he was appointed to dress and to keep; and we have seen

how this is possible only under certain conditions. In the proceedings, or rather inactivity, of the ignorant and slothful above detailed, these conditions are wholly wanting. And we saw how they necessarily lead, not to increase and extension of population, but to the extermination of it. In the processes of industry alone, as they are connected with the double office of agriculture, that of dressing the earth and that of keeping it, are these conditions to be found. In this matter, than which none can be more important, as in others, it is certain that ignorance, negligence, and sloth, are hurtful to the interests and obstructive to the duties of man, just as, by intelligence, foresight, and activity, man becomes useful, promotes his interest, fulfils his duty, and completes his destiny. Further we see that what is prejudicial in the way of performing his duty and detrimental to his interests, is that which also debases man, corrupts or extinguishes his purer and nobler tastes, familiarizes him, and leaves him in contact with what is foul, unsightly, and noxious; whereas it is his high prerogative that he is endowed with faculties, which, in happier circumstances, procure to him a peculiar delight, when he contemplates the wooded hills, the cultivated plains, the trees, the flowers, the beautiful fruits, which the mind and hand, by intelligence and toil, raise up from the willing fertile earth, and by which she yield ssubsistence and health to the physical necessities, and recreation and gratification to the moral and mental susceptibilities of man. Is there anything yet to be added to commend this subject to our attention? It is found in the consideration, that with the neglected duties of man and his debased condition, there are associated not only ignorance, sloth, and vice, but disease, suffering, and death, while, on the other hand, where intelligence, industry, and prudence, characterize a people, where a moral and mental elevation obtains sway, there we look not only for prosperity, but a contentment, disquieted only by the ardour of the pursuit of higher achievements and success, a security and enjoyment of life unknown elsewhere, and the study and use of all that promotes perfection of development, bodily energy, mental activity, health, longevity, productiveness,

and happiness. Or will any one say that this is an exaggeration,—a picture rather of what ought to be, than a representation of the reality among any people, which has yet existed to gladden the earth or give extension to the capabilities, and minister to the prosperity and happiness of man? Be it so; then is there the more need that we give deep, thoughtful deliberation to what in the light of reason, to what tried by the test of æsthetic sensibilities, to what brought in contact with our deepest moral emotions, is found to be a subject of profound interest, and to what, compared with the state and duty of man, is clearly matter of very high importance. For if the world has not yet a people, elevated enough above earth and earthly conceptions, to see the truer and nobler way their duty and destiny open up to them—nor wise or tender enough to be allured to the right path by the hope and prospect of a common and bountiful reward, then all the greater obligation rests on us to arouse the supine to activity, to enlighten the ignorant to urge them to acquire knowledge, and animating the selfish with another spirit, impel them to deeds of wisdom and benevolence.

But in order to fulfil the duty which has been indicated—that of returning to the earth the products it yields; when they have become waste or recrementitious, to fertilize the soil, the right management and conservation of these is indispensable. This is a wide and extended subject, which cannot be surveyed even in the briefest manner. There is one special branch of it, however, which lies peculiarly in our way. This is that which concerns the regulation and control of all that is effete, and will prove noxious, if neglected, by pollution of the air which surrounds the habitations of men, whether solitary, or more thinly, or more densely, aggregated. The great sources of evil which require to be looked to, are our latrines, bath-rooms, kitchens, and stables. The application of the principles we have sketched, as respects the management of these necessary yet noxious conveniences will be best seen if we try to bring them to bear on a small scale. For this purpose let us select the mountain

station of Mahableshwur. To begin with isolated houses, we will look first at the kitchen. The floor is clean, the roof black with a varnish of smoke, the wall opposite the door at which you enter, or perhaps some other, has a buttress built up against it like a ship's bunker, and on this, fire-places are ranged; and here may be seen bright fires, pots which should be bright, and the simple nor much varied apparatus of the cook. Pots and dishes may be seen on the floor also, and a lower fire-place fitted for spits; but one corner is destined for another use. There is a small square, built higher than the floor. It slopes to the corner, where an outlet is to be seen. Here are water vessels near it. Here everything is washed, here all waste matter is cast down, or poured out, and all issues from the hole in the corner; and a foul stream and a foul putrescent lake of fœtid, waste matters is spread out or lies concealed in a cesspool at not many feet from the outside wall. Here is an evil, and how is it to be remedied? It seems possible that some receptacle might be used inside, daily removed, cleaned, and replaced, which should serve the purpose of conserving the waste matter and of permitting its being carried to a distance, where it may be useful, or to be buried in some convenient spot. The water of bath-rooms should, in like manner, be conserved, and might be used at once for horticultural uses. Allowed to flow and lodge outside the wall, it is noxious. In respect to latrines, the old plan of a small wicker basket, with a small portion of straw, put into it and placed in a recess in the wall under the seat of the latrine, is most offensive and injurious. Commodes in private families ought universally to supersede, if they have not superseded, such a barbarous practice. For servants, under proper cover a tub sunk in the ground so that the top shall be on a level with the surface of it, dammered with a composition of equal parts of coal tar and dammer, or the pitch of this country, should be used. A covered top affords a standing place with a slit in the middle, to be fitted when the tub is removed by a sliding board, and two iron handles through which a pole passes, to rest on the shoulders, for carrying it, completes the apparatus. But when the house and seat and recess in the wall exist, what

is required is, that a cylindrial bucket, made of iron and dammered as before, of height nearly as great as the seat, with a loose, curved handle lying two inches over the rim should be passed under the seat from without and removed, cleaned, and replaced daily. This will catch, retain, and remove everything offensive, and keep the building and ground perfectly clean. In regard to each one of these places, it is plain that the servants of each house should perform these offices of removal; but a difficulty will be found to arise here, and additional work will be weighed in the balance against old usage, injury, and neglect, and will kick the beam. Custom will be pleaded against innovation. The dissatisfaction which should be expended on the old practices will be transferred to the new proposals, and these will be objected to, negligently set about, or resisted altogether. And men who pretend to philosophy, and delight to trace the relation between effects and their causes will say, "It cannot be denied that there is good in the new movement, and the originator of it is a well-meaning man, but with little discernment withal, and weak-minded." "This is always the way," he will say, "with your enthusiasts and over-zealous reformers. They grasp at too much, and thus lose all. These things should have been gone about quietly, and introduced one by one as men's convictions grew upon them, and constrained them to come over to the right side." Very good, gentle critic. Yours has not been the weary thought to devise or the toil to propose these things. You have had set before you what you are pleased in part at least to approve. Pray be kind to another's failure. And pray be kinder yet, and set about the work, and carry out according to your own exquisite conception of what is expedient, what remains, or is yet wholly to be done. Take this advice and let your practice be guided by it. And we give you an example into the bargain. The bees produce a perfect whole. Was it in their design to do this? They do each but a small part of the whole. We may not say so; but we may say that the whole was in thought somewhere, before the bees translated it into work. Meanwhile opposition, or worse, *nonchalance*, which does not stir the feelings and rouse up partizans,

as opposition does, may be expected; and therefore it were very desirable that public carts could be kept to go round, at stated times, to stimulate exertion in a common good, by removal of the conserved waste, or conservancy, of each house, and carry it to a proper place of deposit, where it would have a market value, and be available, and most useful, for agriculture. It yet remains to make a remark as to the stable. The waste of the stable will now probably be sought after for use in the fields, and on this account if it bears no higher value, may be removed freely by those who want it, and little nuisance is likely to arise from it: but if it be otherwise, and the removal troublesome, it may be easily burnt—a very profitless expenditure of it. The whole recrementitious waste of the horse, liquid and more solid, both for health and purposes of agriculture, ought to be carefully conserved. Old thatch is to be also carefully burnt or otherwise disposed of.

Having laid down these principles for private dwellings, the application is not difficult on a larger scale. When bodies of men are aggregated, such as detachments of Horse and Foot, under proper shelter, it seems not unreasonable to think that the vessels or tubs sunk in the ground and level with the surface, designated before for the use of servants, would be readily taken advantage of; and with due attention to daily cleansing, easily effected, the air would be preserved pure, health entire, and the waste of life would be deposited where it would be useful, or at least not noxious.

In regard to the Bazar, whatever the population, a simple calculation will give a tolerable guide to the requirements of the plan as respects latrines and their accommodation. It may be assumed that the matter to be provided for and removed—I do not speak of street cleanings and offal, but of recrementitious waste matters—the effects of the economy of life of the inhabitants, will amount to a quantity represented by the number of inhabitants multiplied by three and converted into pounds. This amount must be distributed into parts,—some assigned to one place, and some to another, respect being had to females as well

as males, when deliberation is held about the position the latrines ought to occupy, and they should be in pairs, and where the population is most, in order to meet the wants of both sexes. Strong stakes and mats might be used to mark off these enclosures if meant as temporary or experimental, and stone or brick walls, if more permanent. In the interior according to the number of seats intended, smaller divisions would be erected to screen the occupants from each other. These seats are those before alluded to, sunk under the ground and easily removeable by the handles attached.

Wherever the matters deported are deposited, there trenches should be used, and carefully covered daily. After some months this becomes excellent and inoffensive manure. It has not been thought necessary to allude to trenching near the Bazar, or detachments. It is efficient if carefully attended to; and as a temporary expedient, admirable: but the other is considered superior, as affording in case of neglect, an immediate check against the negligent, and as being better in point of prosperity.

The natural wood of Mahableshwar, its decaying leaves, and the ferns, so conspicuous a feature of the hill, might suffer diminution without disadvantage. In some places the view might be improved, in some the access of the breeze would be favoured by the removal of trees: these, if they cannot be made marketable, with the leaves everywhere undergoing a slow decay, and the ferns turned to no account, might be burnt and be productive in Potash. Scarcely any tree has less than 1 per cent., many greatly more, and the ferns, in Europe at least, are exceedingly productive in Potash. Certain tribes of the people practise the art of the manufacture of Potash, and if they were encouraged to produce the kshur, or khur, *i. e.* potash, on the hill, a branch of industry might spring up, an improved aspect characterize the place, and its salubrity be promoted.

But settlers must have privileges. They must have the privilege to live. We have been trying to point out work for them, and to find manure for them; yet something is wanted.

They must have water. At suitable places reservoirs should be formed to provide this inestimable supply. And they must have another privilege. They must have roads for the transport of articles whether of consumption, or of production. And the Government which rises to the conception of its duty in these matters attaches to it the wise and good, who admire and support it, while it reaps the higher glory of scattering, with bountiful hand, benefits amongst the poor.

THE SANITARY CONDITION OF HILL STATIONS, WITH ESPECIAL REFERENCE TO MOUNT ABOO.

By Dr. MOORE, in Medical charge Aboo Sanitarium.

WITH STATISTICAL TABLES, COMPILED FROM THE ABOO SANITARIUM HOSPITAL RECORDS, AND OTHER SOURCES.

Read July and August, 1862.

General Peel, as recently as November last, in his speech at the late "Herbert Memorial" meeting at Willis's Rooms, stated—"The British soldier has a right to expect from his Government, that he will be provided with every thing that tends to his comfort when well, and to his recovery when sick."

Medical Officers from the time of Lind—who devoted a short section of his work to the subject—have not ceased to recommend, that Europeans serving in tropical climates should reside in elevated localities, in preference to the plains below.

The credit of establishing the first Sanitary Station in the Himmalays would appear to be due to the exertions of the late Superintending Surgeon Gibb, of the Bengal Army, who as early as 1820 was exerting himself in this direction. This officer was ably seconded by Julius Jeffreys, who in 1824 wrote his "Essay on the Climate of the Hill Provinces of the Himmalayas." In consequence of this Essay, as Mr. Jeffreys tells us (The British Soldier in India, page viii.), the attention of Government was more immediately directed to the subject, and the Military Stations of Simla, Missouri, and Landour, shortly afterwards fixed upon.

The late "Report on the Extent and Nature of the Sanitary Establishments for European Troops in the Bengal, Madras, and Bombay Presidencies" shows that, instead of three, upwards of thirty Sanitary Stations now exist, most of them situated on one or other of the Mountain ranges.

The Report just mentioned is a striking confirmation of the fact that our wise and humane Governments have long acted on the principles enunciated in the quotation above given from General Peel's speech at Willis's Rooms.

The same Report must also be a source of congratulation to those who, like Jeffreys, early in their career devoted themselves to promoting the great Sanitary Improvment of placing European Soldiers in the Hill Ranges of India, instead of the burning plains below. Moreover it is also highly encouraging to others who, recognizing existing defects, may determine to use their best endeavours to bring such matters under consideration.

It will not be questioned that I am justified in holding the opinion that, if the *desirability* of any change affecting the health of the troops *be demonstrated*, such alteration will be ordered by authority.

I purpose in this paper making an attempt to prove that the advantages derivable from the climate of many Indian Hill Stations *are negatived* by the neglect of sanitation in such localities; that preventible or mitigable diseases are much more prevalent on Mountain Ranges than they should be; and that so long as this remains the case, the majority of our Indian Hill Stations can only be regarded as "Retreats from intense heat during the hot months."

It was remarked by Dr. Johnson that "an ignorant man will deny more in a single hour, than one hundred doctors have proved in one hundred years." Were I certain that these remarks would never be perused by any excepting members of of the Medical Profession, I might with propriety abstain from mentioning any of the triumphs which Sanitary Science has latterly obtained over the causes of disease. As it is, however, some of those individuals referred to by the great lexicographer may peruse these lines, and hence I cannot refrain from referring to a few of the advantages the world has derived from the adoption of Sanitary measures.

It is far from my intention that the foregoing remarks should apply offensively to even the class indicated. In witnessing the apathy and neglect with which the truths and teachings of Sanitary Science are frequently received, even in the 19th century, feelings " more of sorrow than of anger" must result: sorrow that the public will not submit themselves to our care as regards preventive medicine, in the same manner that they place confidence in our *less certain* curative means. The man who, when sick, takes our medicine without remonstrance, when well, ignores or even treats with contempt our Sanitary regulations. He does not profess to cure disease. Although many are ready and sufficiently capable in their own opinion, to animadvert on the Doctor's conduct—he does not ever attempt to distinguish disease, and yet he practically shows that he imagines he knows more of *its causes* than the person who has made such knowledge the study of a life. Let such remember the line of Horace " Nec scire fas est omnia."

" One science only can one genius fit,
So vast is art, so narrow human wit."

I shall confine myself to an enumeration of a very few among the great advantages which attention to Sanitary matters has from time to time conferred on the human race.

I suppose even the most sceptical will not dare to deny, that many of the laws promulgated by the inspired Moses, were sanitary regulations in their fullest acceptance, intended for the enforcement of cleanliness, and thereby the removal of the causes of disease from the Israelitish camps.

Among these may be mentioned the directions what to eat, and what to avoid (Leviticus, chap. vii., chap. xi.); the purification of women (chap. xii.); the laws concerning leprosy (chap. xiii.); the disposal of excreta (chap. xv.), &c. &c.

Had it not been for such wise regulations, we of the present day, with our knowledge of the epidemics of the middle and later ages, have no difficulty in surmising the diseases which would, in a semi-tropical climate, have decimated the camps of the children of Israel.

Again, we may trace Sanitary regulations, in very many of the religious ceremonies of the people among whom we live. the Mahomedans and Hindoos of the East. Were certain regulations of the above religions nullified, and the general meagre sanitation of European civilization not substituted, the cities of India would become infinitely more prolific in the production of zymotic disease, than is at present the case.

In ancient Rome, the naturally malarious position of the city was only combated by constant attention to sanitary matters. Thus, in consequence of the badness and deficiency of the water, this invaluable and indispensable necessary was obliged to be brought to the inhabitants by means of aqueducts. There were several of these magnificent structures. One brought water upwards of sixty miles; rocks were hewn through; mountains tunneled; and valleys arched for the purpose of carrying out this gigantic design. The water was brought into reservoirs termed "Castella," and from the "castella publica" flushing and cleansing of sewers, houses, and streets was effected, which not only raised the general physical health, but also efficiently contributed to the morality of the community.

The baths also of Rome, during the days of the republic, must have been an immense aid to the general salubrity. At this period we have authentic evidence that these structures, although dark and far from commodious, were used by the "oi polloi" with great benefit. It was not until the days of the Emperors, when the simplicity of structure of the bath began to give place to the "frigidarium," "calidarium," or "balnearium," when effeminacy, and luxuriance, and neglect of Sanitary matters generally, took the place of Spartan denial and simplicity, that the Roman empire began to decline.

It will also be admitted that the Sanitary teachings of Lycurgus must have had great effect in inducing the general healthy constitution of the people amongst whom he lived.

Again in later times, what except Sanitary regulations, destroyed the jail fever, which in the last century ravaged our

prisons and was frequently conveyed from the criminals to the jury and judge who tried their cases ?

The almost entire extermination of scurvy and dysentery in England is one of the most striking facts in Sanitary Science. In the 17th century, the annual number of deaths from dysentery and bowel complaints fluctuated from 1,000 to 2,000. Now the Registrar General's reports show that the same diseases kill from 20 to 100 annually !

In former days ague and malarious fevers were prevalent in Great Britain; now, owing to an universal system of drainage and proper cultivation, these diseases, excepting in a few isolated districts, have become unknown.

"Batavia" for some time past has ceased to deserve the name of "the grave of Europeans," the part of the city built on alluvial soil has been almost deserted as a residence by the Dutch, who now live on higher ground.

In "Sierra Leone," on the east side of which lies a large undrained marsh, an improvement of the great general unhealthiness has been attained by the introduction of better water for drinking, in iron tubes from the heights above.

"Arica" on the coast of Peru, situated in the desert, used formerly to become a dangerous abode after the overflow of a small river in the vicinity, but has now been rendered healthy by preventing that taking place.

"Acapulco" on the coast of Mexico, has been rendered more healthy by cutting through a mountain and obtaining a freer draught of air, whereby the drying of the soil has been promoted.

Before the marsh of Chatreuse was thoroughly drained, malarious fever in one year killed 8,000 persons in the immediate neighbourhood.

What was it excepting the general want of Sanitary regulations, which in the early period of the Crimean war, caused the decimation of an army and the lamentations of a nation ? and what but Sanitary regulations enabled us to contrast the health of

the British army, during the latter period of the same campaign *favourably* with legions employed on garrison duty at home.

Again in the late China war, Sanitary Art enabled us to show "the almost unparalleled spectacle of an army moving rapidly in an enemy's country, and that country the sea-coast of a semi-tropical district, in the highest condition of health, and therefore efficiency: the soldiers' health being equal to the highest rate of the civilian at home."

Were it needful, numbers of localities in India might be mentioned where sanitation has done much towards turning an unhealthy locality into a salubrious one, or towards rendering the latter still more conducive to health.

There are scarcely any localities where, both on account of the peculiarities of the climate, and the particular conformation of the surface of the ground, Sanitary regulations are *more demanded*, than in Indian Hill Stations. Neither are there any sites where such requirements may be effectually carried out with greater facility.

As an illustration of these remarks the all-important subject of drainage may be adduced. Mountain ranges are composed of rocks in the hollows and valleys of which, disintegration and decay of vegetable products have caused deposits of rich soil of a very porous description. The water percolating through this sponge-like mass, lodges in the cavities of the rock. For fluid so lodging there is *no escape* by drainage, and hence under the influence of a hot sun,—as is the case on the plains—the occurrence of paroxysmal fever demonstrates the formation of malaria.

Of course if the geological formation presents those conditions—among which a large proportion of ferruginous hornblende appears the chief—which are now known from experience to be inseparably connected with malarious disease; then, as is shown by Dr. Hyne ("On the Hill Fevers of the South of India") the paroxysmal demonstrations will become doubly violent, from the presence of an additional cause.

Hence it is necessary, as a sanitary measure, to avoid mountain ranges containing ferruginous rocks, and to institute a thorough system of drainage in other localities, in the carrying out of both which requisites much difficulty need not arise.

To allow the water to lodge in hollows, and to saturate the soil without any attempt to cut channels down the natural slope of the ground for its speedy flow, is to court that disease which experience has so frequently shown is the certain sequel of all drying marshes. That height alone, unless indeed we pass near the range of eternal frost and snow, will prevent the formation of malaria is not a tenable idea. The causes of paroxysmal fever evidenced by the mild type of the disease, are certainly less intense on mountain ranges, but that malaria is there formed is sufficiently demonstrated by the following tables on malarious fever. The reasons for its being less active in its nature are to be sought for in the smaller amount of evaporating surface which an undulating range presents and in the natural drainage which the formation of the ground necessitates, *for while such formation prevents drainage from a lower stratum, it facilitates fluid exit from the surface.*

Broadly speaking, the climate of mountain ranges may be said to differ from that of the plains in having a mean temperature, some ten to twelve degrees cooler than the latter; in being above the range of the hot winds, and in the greater damp which exists during the monsoon season.

In a cold climate such as England, where decomposition is retarded by the low atmospheric range, and by the frosts and cold of the winter season, the value of sanitary measures has been over and over again demonstrated.

Under the action of a tropical sun decomposition goes on "*viâ siccâ,*" and excepting in the confinement of sewers and cesspools, where the same process does not take place, the products of such decomposition are by no means so injurious as those which result from decay "*viâ humidâ.*" Indeed, as Mr. Low states (Medico-Historical Narrative of the B. Company

Madras Engineers, 1857-8), under the full glare of a tropical sun the "*bodies of animals dry up like mummies, no decomposition taking place.*"

Hence we find that both the cold of a temperate clime and the intense heat of a tropical sun, are made by a Merciful Providence subservient to the health of man.

When however, man, for his own convenience ascends the mountains of tropical and semi-tropical regions, he finds that such preventives of disease do not obtain with equal force. He *finds that there is neither the cold of the temperate region, or the intense heat of the equatorial zones retarding the progress of decomposition*, or the preparations of disease, to nearly the same extent which exists in other localities.

Hence I ventured to state, that Sanitary measures are even more demanded on Indian Hill stations than on the plains, and under this particular head, Conservancy holds an important place, and

"Tho' low, the subject still demands our care."

Although the composition of the atmosphere has been, over and over again, demonstrated to be the same, whether such air be taken from the summit of mountains or the centre of cities, excepting the small quantity of sulphuric or sulphurous acids which exist in the latter (the products of the oxidation of sulphur from burning coals), still it must be recollected, that *air like water may be soiled.*

It is not difficult to prove that animal and vegetable matter, during a state of decomposition disengages from its surface portions of its substance of sufficient tenuity to be invisible, and to remain suspended in the air. Without referring to offensive smells which of course are material, we have other sufficiently strong and satisfactory proofs. If a glass be inverted over decaying matter, its inner surface becomes covered with microscopic fungi, the same description of which are found also in the glutinous drops depending from the roofs of sewers, which must have been derived from the air of the receptacle. Again,

milk turns sour if exposed to putrid exhalations: butchers cannot successfully kill meat near a stinking gully; and flesh will not "keep" in a moist, cloudy atmosphere, which is most retentive of organic impurities. Again, the fact that sulphuric acid becomes dark colored, on passing impure air through that fluid, sufficiently demonstrates the large amount of organic matter which the air contains, and the acid chars.

Also Dr. Angus Smith's ("On the Air of Towns") now well known experiments of passing air through a solution of *Permanganate* of Potash (the strength of which had been previously determined by its power of decomposing oxalic acid), demonstrates that the same quantity of the *Permanganate* which was decolorized by one bottle of air obtained in a close court in Manchester required twenty-two bottles to decolorize it on the hills in the neighbourhood!

Those who are conversant with the physiology of respiration, and understand the process of the decarbonization of the blood, which takes place in the vesicular structure of the lungs are well aware of the danger of a sudden, or constant absorption of such atmosphere. Those who are ignorant of the anatomy, physiology, and chemistry of respiration, can only deduct from analogy; but all are more or less aware of the effects which follows the inhalation of chloroform; of carbonic acid gas from burning charcoal; of the aroma of wine in large vaults, and of the deadly results from concentrated sewer gas.

The public however are not aware, or rather perversely remain apathetic about the effects of diluted sewer emanations, or of tainted atmosphere arising from putrifying organic matter. Such emanations will not only destroy life immediately, but, as Dr. Letheby states, will, when mixed with common air, cause asphyxia and narcotism: in smaller quantities will induce nausea, delirium, and general insensibility; and in still further dilution cause general prostration of vital powers; failure of appetite; *diarrhœa* of *a chronic character*; *exhaustion*, and *low fever*. The latter, let it be remarked, are the very symptoms of *Hill Diarrhœa*.

The history of the Mahammurree, or Indian Plague, which formerly ravaged the Himmalayas, from the Snowy-Range downwards, affords an example of what will arise from defective sanitation, and Hygiene on Indian Mountain Ranges, and also a striking instance of the success of preventive measures in arresting the progress of epidemic disease.

Without attaching undue importance to the septic theory of disease or venturing to ascribe the occurrence of any particular malady to any peculiar decomposition, there is ample evidence that dirt and filth, particularly the "slow rottenness of decaying excrement" not only acts insidiously and injuriously on the constitution, but also affords a "local habitation" to those mysterious atmospheric, or electric changes, which so frequently precede or accompany epidemic disease. As Mr. Simon (The Fifth Annual Report to the Commissioners of Sewers) wrote—
"Through the unpolluted atmosphere of cleanly districts it
"migrates without a blow: that which it can kindle into *poison*
"lies not there. To the foul damp breath of low-lying cities
"it comes like a spark to powder. Here is contained that
"which it can swiftly make destructive, soaked into soil,—stag-
"nant in water—griming the pavement—tainting the air—the
"slow rottenness of unremoved excrement, to which the first
"contact of this foreign ferment brings the occasion of chang-
"ing into new and more deadly combinations."

The researches of the late Dr. Snow; of Pettenkofer of Munich; of Thiersch of Berlin; of Dr. Bidie of the Madras Service; of Dr. Acland of Oxford; and others, incontestably demonstrate that one at least, of the modes in which cholera is propagated, is by the choleraic discharge, either through the medium of water, or otherwise.

Dr. Budd (*Lancet*, July 23, 1859) states "like malignant
"cholera, dysentery, yellow fever, and other diseases which
"could be named, Typhus is one of the great group of diseases
"which infect the ground;" and Mr. Simon (*Times*, June 17th, 1861) endorses this assertion.

Pettenkofer (Investigations into the Propagation of Cholera, 1855) entertains the opinion that cholera never prevails epidemically on rock, and explains this supposed fact on the ground that excrement cannot penetrate the soil, and that the rock neither takes or gives off moisture. If this be true, as we have every reason to suppose, it accounts for the exemption from cholera which some of our Indian Hill Stations have afforded, and it likewise illustrates the occurrence of the disease after a continued occupation of the place, after excrement has been allowed to accumulate "stratum super stratum" on the surface of the soil. As Mr. Mackay forcibly writes (Sanitary state of Ootacamund, *Madras Journal Med. Science*, Vol. 5. 1861.) "Every convenient bush is made use of to deposit filth under....." "Should the preparations for its (Cholera) reception continue, in "the way of a disregard of all sanitary arrangements, there is "every reason to fear that cholera will some day exhibit its "virulence on the Neilgherries as it has done in other temperate "climes." Prophetic words! but, like Cassandra's voice unheeded! The *Neilgherry Star* of November 13, 1861 reports— "Another case of cholera terminated fatally in the Dispensary "last Wednesday. The dreadful disease has now unmistakeably made its appearance among us!!

We have already seen the ravages which the "Mahammurree" or Indian Plague has committed on the Himmalayas—a disease which appears to be closely allied to Typhus fever in its most prominent characteristics: and by a continued delay in attending, *most scrupulously* to the conservancy of our mountain stations, a *generation will not pass away before we shall have to record the epidemic prevalence of other zymotic diseases with even greater violence than is at present the case.*

I shall now proceed to give a few extracts from published reports, &c. showing the present sanitary condition of some of the Hill Sanitaria and their buildings.

According to Mr. Grant (*Indian Annals, Med. Science*, 1852), "nothing could be worse than the state of the conservancy at "Simla." He describes the smells along all the by-paths as being

" most disgusting, from accumulations of human ordure, offal, " and dead animals in the numerous deep, close ravines that " intersect the Station": in fact a native population amounting to 10 or 12 thousand people were scarcely restrained by any police rules, and hence an amount of nuisance scarcely credible.

That the sanitary condition of Simla is not much improved in the year of Grace 1862, is evident from the subjoined information afforded me by Assistant Surgeon J. J. Clarke, now in medical charge.

Dr. Clarke writes (10th Jan. 1862). " The native bazaar is " built of tiers of houses on the south side of the Hill, and cuts the " station of Simla in two, with about the same number of Euro- " pean houses on the eastern as on the western side of it. Its " main street which is a thoroughfare, and the high road from " Chota Simla to Boileau Gunj is kept clean, and is drained " by the means of open drains which flank it on either side. " Its lower streets are for the most part filthy; badly drained " and with no well adapted means for clearage. It is densely " populated, and the nuisances of this large population are " allowed to ooze and dribble forth of themselves, finding their " way into the several nullahs which run down the side of the " hill. So that in truth the whole filth of this extensive bazaar " lies hoarded in these several cesspools during the hot season " until the rains, impregnating the air with emanations most " detrimental to health."

" There is no Conservancy office here, and neither the local " nor municipal authorities appear to have instituted any " measures for providing for a complete system of drainage."

" If in years past the welfare of the European community " had been duly considered, some authority or other might have " prevented the growth of the bazaar to such an enormous and " unnecessary extent. It is now a great central evil militating " against the sanitation of the station, and instead of being, as " it should be, a clean, regularly built native city, with only a " sufficient number of shop-keepers and servants, to minister

" to the wants of health-seeking Europeans, with suitable " measures adopted for its clearance and drainage, it is an " irregularly built, unsightly collection of houses ;—a bazaar, in " fact, many times longer than need be,—harbouring the lowest " dregs of native society ; and radiating from it, in all direc- " tions, are drains and cesspools, offensive and filthy to a degree.

Dr. Mackay (*Madras Journal Med. Science*, Vol. 5, 1861), reports of Ootacamund. " The station is divided by a deep " valley, a large portion of which is filled with water forming a " lake. At the upper extremity of this the large station bazaar " is situated : the houses there are crowded together—those in the " lower street are built close to the water, many of them on a " foundation formed by the rubbish thrown out from the houses " above, and the filth washed down by the rains from the upper " street. With every natural facility for doing it effectually, " drainage has been totally neglected, not only in the bazaar, " but throughout the whole station. It will hardly be believed " that undrained swamps still intersect this important sani- " tarium. The invalid may shoot snipe in some of those without " leaving the compound of his house. Some of the best houses " are built on these swamps, some over them, and not a few on " a lower level than the swamp itself. The potato cultivation, " the noxious weeds, nettles, brambles, giant thistles and lobe- " lias are described as most luxuriant and objectionable. In " short the whole station is a strange mixture of neglected " compounds, bogs, and neat flower gardens. Every conve- " nient bush is made use of to deposit filth under of every " description. The sweepings and refuse of each dwelling are " thrown where they can be conveniently disposed of. It is " argued that the station has been healthy ; that such things are " better left as they are, and that no injurious consequences can " result in this region ! "

It has already been demonstrated in this paper that such a region, partaking of both temperate and tropical climates, is just the locality where the most fearful diseases of both climes meet !

It has already been shown that Dr. Mackay's prophetic voice, "That should the preparations for the reception of Cholera "continue, in the way of a disregard of all sanitary arrangements, "there is every reason to fear that Cholera will some day exhibit "its virulence on the Neilgherries," has already come true!

When this is the condition of our principal Hill Sanitaria—only so in name—no wonder that Dr. Mackinnon, Deputy Inspector General of Hospitals, should remark—"Of late years Simla has rather retrograded in public opinion as a Sanitarium." (Report on the Extent and Nature of Sanitary Establishments for European Troops, p. 73.)

Of Nynee Tal it is stated—"The Aya Palta side of the lake is "dreadfully damp: hundreds of trees might be felled with "advantage to those who live on that side. A place so shut in by "nature, as is Nynee Tal, requires no superabundance of trees, "and still less of jungle, to make it unhealthy, and those who "have passed a rainy season there can hardly forget the one "drawback to a residence in that beautiful spot; the cold damp "smell that arises before sunset, and continues throughout the "night, which a dozen sharp hatchets might remove in a short "time." (Kumaon and its Hill Stations, *Calcutta Review*, June 1856).

A later writer—(*Times of India*, Sept. 7th, 1861), states of the same station—"Let the brushwood and jungle be cleared "away, leaving only so much timber as is necessary for fire-"wood, and for scenery. If any one doubts how unhealthy "Nynee Tal is becoming, let him go into the grave-yard, and "count the number of new graves, and then let him go into the "soldiers' hospital and see the pale yellow faces of men in whom "hope has died away, who are rather worse than when they "came up.....Another great nuisance of Nynee Tal I "have alluded to, I mean the rank state of the weeds in the lake, "and the jungle round the lake. To walk round the lake on "the lower mall is quite enough to give a weak man a danger-"ous fever, so great is the malaria."

Of Ootacamund again, it is written in the *Neilgherry Star*, November 13, 1861—"Let any one reflect for an instant what "must be the state of the upper portion of the lake. We know "not what may be the exact population of the Bazaar, but we "should certainly estimate it at upwards of 2,000. What effect "then must be produced by the dirt, refuse, and filth, of this "large number of human beings cast daily into the head of the "lake. Let any one compare the water of this part with that "where the lake overflows the lower bund, and empties itself. "The one will be found filthy in the extreme, the other quite "clear. The lake is our filter. We cast in our dirt at the top, "and draw off the clear water at the bottom. The only unfor- "tunate part of it being, that the clear water goes from us while "the filth remains to poison the lake and breed disease."

The Hills describes Darjeeling as a "dismal hole," subject to fever "on the spot." Small-pox is stated to be there an indigenous disease, and is described by Dr. Collins as the scourge of these Hills. It may be recollected that Miss Nightingale, at page 19 of her "Notes on Nursing," while dissenting from the doctrine that a disease having once originated is handed down from one generation to the other, declares that she has *seen and smelt* variola forming in various localities, the abodes of filth, and destitute of sanitary arrangements.

Of Dugshai, Dr. Bradshaw writes (9th January 1862).— "There are two barracks for married men, each intended for "30 families. They are at the south-western corner of the "station, and separated by the parade ground from the other "station buildings. Their positions are very good indeed, but "the plan upon which they are built is remarkable for its want "or defiance of common sense. Each barrack is the ordinary "ugly barn surrounded with a verandah, and divided length- "wise in the interior, by a long tunnel-like passage, which "communicates with the verandah at each end, and on each "side by two narrow passages. In this tunnel are six fire "places, and into it open the doors of all the rooms. These "rooms are small, incompletely divided one from the other,

"by make-shift partitions, and insufficiently lighted. The "women use the fire-places for cooking and other purposes, "and ordinarily the passage is quite dark from smoke, and un- "pleasant from culinary odours."

"These quarters may not be unhealthy owing to the counter- "acting healthy climate, but their arrangement certainly is "most defective. None of the rooms communicate directly "with the verandah, and this is closed at each end by rails. "Imagine 30 families in a house with only four narrow passages "as outlets. Should a fire occur, the inmates would almost "certainly lose everything, and even life might be endangered "before exit could be made. Besides, from the smallness of the "rooms, absence of opening in the roof for ventilation, and the "close, narrow, middle passage, the houses can hardly be other- "wise than unhealthy, or deserving of any other name than "kennels, or other fate than being pulled down and rebuilt."

Dr. Mackinnon, reports of the Hospital at "Dugshai" that it is "so dark and gloomy that its effect on the sick cannot be "otherwise than unfavorable." (*Report on Sanitary Establish- ments*, p. 71.)

All the sanitary defects which have been noticed as existing at other places, are present on Mount Aboo. Holes and pits abound in the station. Marshy spots radiate from the centre to any extent. Drainage is almost unknown. Deciduous vegetation arises and decays, with but little check on its pro- gress: there is no one endowed with magisterial powers resident during the whole year; *and there is not, nor ever has been, a single public scavenger employed for the station!*

Public latrines also are much required. In consequence of their absence the natives use the ravines and bushes as their temples of Cloaca, and the refuse of the bazaars accumulates somewhere in the immediate neighbourhood. Until latterly also every house had its dunghill attached, but these having been made the subject of complaint have now generally been re- moved.

With regard to the Aboo public buildings little commendatory can be stated. The barracks are situated in one of the lowest and most malarious valleys in the place, on an oozy, porous soil, overhung by rocks 1,000 feet high, and communicating with the miasmatous lake by two ravines. In order to add to the unhealthiness inherent in the site, the buildings have been built gable end on to the prevailing breeze! And with what would appear a desire to do things opposite to the requirements of health, the latrines, wash-houses, and urinals of No. 1 Barrack have been placed directly to windward of the latter building!

It is, however, an ungrateful task to chronicle the sanitary defects existing in the various Hill Stations. Enough has been stated to demonstrate that these matters call loudly for reform; otherwise faults might be referred to as persistent at Murree, Subathoo, Kussowlie, and other places. (*See* "Report on the Extent and Nature of Sanitary Establishments for European Troops.")

It therefore affords pleasure to bring forward an instance of a Hill Station which has some pretensions to be a SANITARIUM.

Dr. Sparrow writes to me from Landour (Jan. 6,1862)—"From "the natural position of Landour, being on the summit of a long "ridge with abrupt declivities on either side, water runs off "freely into the nullahs, about a thousand feet below the hill: "it is but thinly wooded: there is scarcely any underwood. "During the rainy season an extra conservancy establishment is "entertained. To my belief there is not a better drained or "cleaner station in India. The bazaar is well kept, well "drained, and clean; this is owing, in my opinion, to the fact of "its being under military and not *civil* control.

Doubtless any person who takes the trouble to read the foregoing remarks, and descriptions of sanitary defects, will be lost in amazement and conjecture why matters so self-evidetnly destructive to health are allowed to continue, and especially in picked localities having the name of Sanitaria. The reason however, just stated in Dr. Sparrow's communication, affords the

explanation why many of the sanitary stations are in so unhealthy a condition.

A number of our Hill Stations are the resort of civilians, officers in civil employ, and others, during the hot season, and in some instances during the rains also, and are under Political or Civil control. During the hot months the causes of disease—as is the case on the plains—are not so rife as in the cold season. Before the former period marshy spots have become dry, vegetation has decayed, or been eaten by foraging bullocks or goats, and the greater power of the sun scorches and dries up ordure and excrement—certainly to a much smaller extent than is the case on the plains but still sufficient to prevent, in a great measure, that decomposition "*viâ humidâ*" which takes place during the cold season, and immediately after the rains.

Thus, individuals making Hill Stations a residence during the hot weather only, cannot fully appreciate those causes of disease which are in existence at a different period. Such persons arriving from the heated plains into a temperature some 10 or 12 degrees lower; finding themselves free from the plagues of heat, flies, and musquitoes; getting refreshing sleep at night; and able to take exercise during the day, imagine the change delightful, and the place, in comparison with the plains, a "perfect Paradise." They see at this season little disease present; they imagine it is always the same; or, if told otherwise, they congratulate themselves that *they* will not be "*here*" during the unhealthy period.

It cannot be expected that the establishment of servants as scavengers, &c. attached to any body of military which may be present at a Sanitary station, should keep the whole locality clean and in good order. Neither can it be expected that Government should pay for this necessary work being done. The great majority of individuals who resort to Hill stations do so for their own pleasure and amusement, either to escape the heat of the plains or for a change of scene and society, and it is by such temporary residents, or by those who make a profit of letting houses to such visitors, that the expenses of sanitation should be

paid. At the same time sick officers—at all events not in receipt of a certain monthly pay—might be exempted from the tax.

Until something of this kind is effected, those sanitary stations, where civilians and military are both located, and where the former have magisterial power, will only be Sanitariums by name. The former during their short stay heap dirt "stratum super stratum" for the benefit (?) of the latter, during the cold and damp season; their brief residence renders them indifferent to drainage or any other sanitary regulation; and as I stated in a certain official communication on the subject,—"it is of little use to keep the neighbourhood of the Barracks "and Hospital in a satisfactory sanitary condition, if the inha- "bitants of those buildings are exposed to the causes of disease, "when they walk abroad, or have them wafted to them as they "sit or sleep at home."

Dr. Mackay in his description of the "Sanitary Condition of Ootacamund" already referred to, states that, "it is argued such "has always been the case, that it is better to leave such matters "alone, that no evil can possibly result in such a climate!" I also have heard much the same argument used with regard to Mount Aboo, and can only remark "*Ignorantia facti excusat.*"

When one gentleman exclaims—"Such has always been the case;" another, "These doctors are always bothering about "Sanitary Reform;" a third, "Why should I clean my compound "when I am only here for a few months?" a fourth, "Wait till the "rains and all the dirt will be washed away;" a fifth, that the abandoned commencement of a well being filled with débris is no nuisance; a sixth (ignoring the fact that each year the place becomes dirtier), "How do you think we managed to enjoy such good health before all this fuss about Sanitary Reform?" When these expressions constitute the feelings of a community on such matters, nothing but *orders* from superior authority will cause an alteration; nothing but orders will place the inhabitants of such a locality on a level, as regards sanitation, with the Israelites of

old, who, under the Mosaic Law, were obliged to remove and bury their excreta.

Either there is truth in the teachings of Sanitary Art, or there is no truth. If there be no truth; if the teachings of Hygiene are fictions; if physiological laws are the day-dreams of a speculative philosophy;—then let our Sanitary Stations remain as they are. If, however, Sanitary Art leads to vigour of health and intellect, to economy of life, and therefore, of the State exchequer, then let us have our Hill Sanitaria made Sanitaria in every sense of the word.

The establishment of a thorough system of sanitation in Hill Stations is sufficiently easy. Let a couple of hundred prisoners from one of the crowded jails on the plains, with a few sepoys as a guard, be brought up the hill: let them first hut themselves, and afterwards set to work, cleaning away vegetation, making drains, building bunds to tanks, enlarging roads, &c. &c. Afterwards let a tax be levied *by authority* on each landlord or tenant—exempting of course the Military on duty, and officers present on sick certificate. Let the proceeds of this tax be spent in keeping in repair what the prisoners have effected, and in the maintainance of a public conservancy and clearing establishment. Let the Medical, as (by Regulations for the Medical Officers of the Army, para. 22, p. 681) is now the case in all cantonments in the plains, be the ex-officio Sanitary Officer, with certain well-defined powers. Let some such plan as this be carried out, and our Hill Stations will then be Sanitaria all the year round, instead of being, as many of them now are, simply refuges from heat during the hot months of the year.

What appears to have been done for the town and cantonment of Kurrachee may be easily effected for our Hill Stations. Dr. Grierson in his Report on Cholera in Sind during 1861 (read at the Meeting of the Bombay Medical and Physical Society held in December last) states—"The regularly paid, well-fed troops "suffered but little. The other inhabitants comparatively little. "For in these stations, and others to some extent, Hygiene has "not been unknown. It is due to Sir Bartle Frere, K.C.B.

"to state, that in Kurrachee first, and afterwards elsewhere, "he originated changes and improvements in this direction, "which only require extension, improvement, and supervision, "to give Sind a character for excellence in this respect, and to "protect in a great measure its inhabitants from the ill effects "of epidemic states of the air. Not simply the removal of refuse, "offal, waste, filth of all descriptions is insisted on, but the "disposal of all noxious matters by inhumation and incremation "in furnaces constitutes the peculiar features of the Hygienic "measures adopted in the Province."

The following Tables relate to the Statistics of Disease on Mount Aboo during the last five or six years.

I. ALL DISEASES.

A. Annual Sickness and Mortality.

Table I.—*Exhibiting the Annual Sickness and Mortality from all Diseases among the Convalescents and Men at the Aboo Sanitarium, during* 1855, 1856, 1857, 1858, 1859, 1860.

Years.	Strength.	Admissions.	Deaths.	Ratio per 1,000 of		
				Admissions to Strength.	Deaths to Strength.	Deaths to Admissions
1855	87·33	254	..	2908·57	....	....
1856	80·25	231	..	2878·50	....	....
1857	67·83	164	1	2417·97	14·75	6·09
1858	120·75	408	3	3378·88	24·84	7·35
1859	145·91	258	4	1768·21	27·48	15·54
1860	139·91	177	5	1265·74	35·74	28·19
1855 to 60	642 *	1,493	13	2323·98	20·24	8·71

* Decimals rejected to facilitate future calculations.

We learn from this table that the *maximum* sickness to strength took place in 1858, when it reached 3378·88 per 1,000; the *minimum* occurred in 1860, when 1265·74 per 1,000 came under treatment, whilst the average annual ratio during the six years ending 1860, positively reached 2323·98 in the thousand. This ratio would have stood still higher, if the entire strength of 642 had consisted of convalescents only: at least 240 of this number were effective soldiers stationed on Aboo, on Detachment or Garrison duty. The mortality to strength amounted to 20·24 per thousand. Of the 13 deaths noted in the table—

1	took place	from		Carditis in	1857
2	„	„	„	Variola	1858
1	„	„	„	Sun-stroke	
1	„	„	„	Remittent	1859
1	„	„	„	Peritonitis	
1	„	„	„	Acute Dysentery	
1	„	„	„	Phrenitis	
1	„	„	„	Carditis	1860
1	„	„	„	Hepatitis ch.	
2	„	„	„	Phthisis	
1	„	„	„	Syphilis	

Whilst the *mortality* is smaller than at any of the Sanitaria in the Himalayas, *the sickness is greater;* the former perhaps because more judgment has been exercised in the selection of men suffering rather from functional than organic disease in important viscera: the latter because the site of the Aboo Barracks is unquestionably bad, and has not been improved by sanitary art. Also because the whole station is destitute of thorough drainage; contains numbers of holes for the accumulation of filth; is never sufficiently cleared of deciduous vegetation; presents at the margins of the "Mukkee Talao," a large evaporating surface; and *never has had a single public scavenger attached.*

The difference between the sickness and mortality on Mount Aboo, and at Himalayan stations is illustrated in

TABLE II.

Stations.	Periods of observation.	Ratio per 1,000 of		Height above the level of the Sea.
		Admissions to Strength.	Deaths to Strength	
* Rawul Pindee.	6 years ending 1854-55	1820·0	27·6	....
* Dughshai. ..	5 „ 1854-55	1772·8	29·8	6,000
† Kussowlee. ..	11 „ 1854-55	1658·6	41·2	6,400
† Subathoo. ..	11 „ 1854-55	1788·6	59·1	4,000
Mount Aboo. ..	6 „ 1860	2323·98	20·24	4,500

It has been remarked by Mr. Murray ‡ and others that those Hill Stations which are inter-tropical, are much more exempted from disease, than are the Himalayan Sanitaria. The above table does not endorse this idea. It shows that disease of the zymotic character (which it will be presently shown constitutes nearly the whole of the admissions) is much more prevalent at Mount Aboo than in the Himalayas : but at the same time, it also demonstrates that such disease is of a less intense type, has a less fatal termination, and therefore would appear to be more amenable to *Sanitary* Regulations.

* *Vide* Ewart's Vital Statistics of the Indian Armies, p. 15.

† The year 1849-50 not included.

‡ Practical Observations on the Nature and Effects of Hill Climates. Trans. Bombay Med. and Phys. Society, 1844.

B. Sickness and Mortality during two periods.

Table III.—*Exhibiting the Sickness and Mortality from all Diseases among the Convalescents and Men of the Aboo Sanitarium during two distinct triennial periods.*

Periods.	Admissions.	Strength.	Deaths.	Ratio per 1,000 of		
				Admissions to Strength.	Deaths to Strength.	Deaths to Admissions.
1855 to 1857	649	236	1	2750·0	4·23	1·54
1858 to 1860	843	406	12	2076·35	29·55	14·23

Down to the end of 1857 the strength was constituted almost exclusively of convalescents despatched from the stations of Deesa and Ahmedabad in Gujarat, and of Neemuch and Nusseerabad in Rajpootana; but from 1858 to the end of 1860, the strength has been augmented by including an effective European Company of 80 men, a fact which should be borne in mind in accounting for the manifest diminution of general sickness during this, as compared with the former period. The *mortality* was very high during 1858-60. A large portion of this period was marked by disturbances and uncertainty throughout Gujarat and Rajpootana, and from whatever cause, the cases do not appear to have been so carefully selected as during the three years ending 1857.

C. Effect of Season on the Sickness and Mortality.

Table IV.—*Exhibiting the effect of Season upon the Sickness and Mortality from all Diseases, among the Convalescents and Men at the Aboo Sanitarium, arranged according to Months and Quarters.*

Months and Quarters.	Strength.	Admissions.	Deaths.	Ratio per 1,000 of		Months and Quarters	Strength.	Admissions.	Deaths.	Ratio per 1,000 of	
				Admissions to Strength.	Deaths to Strength					Admissions to Strength.	Deaths to Strength.
6 Januarys.	508	75	1	147·6	1·9	6 Julys.	763	129	1	169·0	1·3
6 Februarys.	385	56	1	145·4	2·5	6 Augusts.	720	113	..	156·9	..
6 Marchs.	470	82	2	174·4	4·2	6 Septembers	731	127	..	173·7	..
6 Quarters.	454	213	4	469·1	8·8	6 Quarters.	738	369	1	500·0	1·3
6 Aprils.	792	94	..	118·6	....	6 Octobers.	685	196	1	286·1	1·4
6 Mays.	831	124	5	149·1	6·0	6 Novembers	561	241	1	429·6	1·7
6 Junes.	798	133	..	166·6	....	6 Decembers.	439	124	1	282·4	2·2
6 Quarters.	807	351	5	434·9	6·1	6 Quarters.	562	561	3	998·2	5·0

April thus appears the healthiest month, and November the unhealthiest month of the year. During the quarter commencing April, the ratio of admissions per 1,000 of strength amounted to 434·9. But during the quarter embracing October, November, and December, it reached the high figure of 998·2. Nearly the whole of the men at the Sanitarium passed through Hospital in this quarter from (as will be demonstrated by and by) the same diseases that fill the Regimental Hospitals on the plains at this season. There is more sickness experienced during the quarter ending December, than during the half year from January to June.

We now leave the subject of the sickness and mortality of all diseases, and exhibit the annual average prevalence of malarious fevers, and the influence of season on the same diseases.

II.—FEVERS.

D. Annual average Prevalence of Malarious Fevers.

Table V.—*Exhibiting the Sickness and Mortality from Malarious Fevers among the Convalescents and Men at the Aboo Sanitarium, during the Six years ending* 1860.

Periods.	Strength.	Admissions.	Deaths.	Ratio per 1,000 of		
				Admissions to Strength	Deaths to Strength.	Deaths to Admissions.
1855 to 1860	642	785	1	1,222·74	1·55	1·27

Thus 1,000 men have supplied 1222·74 fever admissions to the Hospital! But the mortality has only reached 1·55 in the thousand—a very low rate indeed. This shows that the type must have been mild and manageable, as is at present the case.

In a Paper headed "Remarks on the proposed site for new Barracks and Hospital at Mount Aboo," and also in my "Annual Report of the Sanitarium for 1861," I mentioned the fact that men suffering from intermittent fever contracted in the valley where the Barracks are located, on being brought to the more elevated site of the Hospital, do not generally suffer from above two or three recurrences of the paroxysm, whatever is the treatment adopted.

It is reported that M. Levy at the Military Hospital at Lille, treated most of his patients suffering from intermittent fever with water labelled *Protoxide of Hydrogen*, and that in these patients, removed from the malarious locality, where they had contracted the disease, the paludal manifestations quickly declined. Something of this is the case in the present Aboo Sanitarium Hospital, which fact speaks volumes for the salubrity of the site, now the immediate locality is kept scrupulously clean.

It may probably be the mild type of fever which exists on Aboo, which allowed my fever patients to progress most favourably when treated with nitric acid instead of quinine. An American Physician in 1854 (*Western Lancet*) first recommended

this acid as an anti-periodic, and stated that its action was that of a strong decarbonizing agent, contributing to the oxidation of the venous blood. This gentleman likewise asserted, that while other periodics act on the nerves, nitric acid attacks the "fons et origo mali" the blood, and thus is a primary agent.

Dr. Robert Hunt (*Med. Times*, Feb. 9, 1861) also recommends nitric acid as a remedy, but contends that an excess of alkali in the blood predisposes the system to disease: that it causes various changes in the system which result in the generation or retention of noxious matter: and that the acid neutralizes this alkaline condition.

However this may be, my experience of the remedy enables me to state, that although like quinine and arsenic—sometimes failing altogether, still nitric acid is frequently of great efficacy, and a valuable addition to our list of anti-periodics. The strong acid in doses of 10 to 12, or 15 drops, three times a day, should be administered in a sufficient quantity of water.

The great frequency of malarious fevers, and the small proportion of mortality therefrom, among the convalescents and men at the Aboo Sanitarium, as compared with the averages of the three Anglo-Indian Armies during the most recent periods available, is well demonstrated in the following:—

TABLE VI.*— *Exhibiting the Sickness and Mortality from Malarious Fevers among the Men of the three Anglo-Indian Armies during recent periods.*

Presidency.	Periods.	Strength.	Fever Admissions.	Deaths from Fever.	Ratio per 1,000 of		
					Admissions to Strength.	Deaths to Strength.	Deaths to Admissions.
Bengal.	1850 to 53-4	84,143	84,357	849	1002·5	10·8	10·6
Bombay.	1850-1 to53-4	37,516	23,707	186	631·9	4·9	7·8
Madras.	1848 to 51	37,493	10,673	63	284·6	1·6	5·9

* *Vide* Table XII., Ewart's Vital Statistics of the Indian Armies, page 46.

Viewing the results embodied in this table in connection with those obtained in Table V., we find that the annual average prevalence of fevers at Mount Aboo has exceeded the average among the European troops in Bengal by 220·24, in Bombay by 590·84, and in Madras by 938·14 in the thousand! It is, however, satisfactory to be able to prove, as before stated, that the fevers of this Sanitarium are much more readily amenable to successful treatment than those occurring on the plains below. The mortality to strength is $6\frac{1}{2}$ times less than in Bengal; $3\frac{1}{10}$ less than in Bombay; and a fraction less than in Madras.

E. PREVALENCE OF FEVERS DURING TWO PERIODS.

TABLE VII.—*Exhibiting the Sickness and Mortality from Malarious Fevers among the Convalescents and Men at the Aboo Sanitarium during two triennial periods.*

Periods.	Strength.	Admissions.	Deaths.	Ratio per 1,000 of		
				Admissions to Strength.	Deaths to Strength.	Deaths to Admissions.
1855 to 57.	236	291	..	1,233·05	..	..
1858 to 60.	406	494	1	1,216·74	2·46	1·10

If it be recollected, that during the latter period 240 of the strength were effective soldiers, the sick of which have been included in one general Sanitarium Hospital Return, along with the sick of the convalescents, it must be inferred, that in reality malarious disease has undergone no diminution whatever during 1858 to 1860. For decrement of 16·31 in the 1,000 is doubtless owing to the smaller number of attacks which took place among the men of the detachment than the convalescents, and not to any decrease of fever among the latter. The causes which gave rise to so much miasmatic fever in 1855 to 1857, were quite as rife in 1858-60, indicating that Sanitary Science has not been practically recognised at Mount Aboo.

F. Effect of Season on the prevalence of Fevers.

Table VIII.—*Exhibiting the effect of Season upon the prevalence of Malarious Fevers among the Convalescents and Men at the Aboo Sanitarium, arranged in Months and Quarters.*

Months and Quarters.	Admissions.	Deaths.	Ratio per 1,000 of Admissions to Strength.	Months and Quarters.	Admissions.	Deaths.	Ratio per 1,000 of Admissions to Strength.
6 Januarys.	38	..	74·80	6 Julys.	53	..	69·46
6 Februarys.	14	..	36·36	6 Augusts.	45	..	62·50
6 Marchs.	17	..	36·17	6 Septembers.	63	..	86·18
6 Quarters.	69	..	151·98	6 Quarters.	161	..	218·15
6 Aprils.	23	..	29·04	6 Octobers.	151	..	220·43
6 Mays.	37	1	44·52	6 Novembers.	206	..	367·20
6 Junes.	51	..	63·90	6 Decembers.	97	..	220·95
6 Quarters.	111	1	137·54	6 Quarters.	454	..	803·52

This table is very instructive. It pourtrays in telling language the real reasons why Mount Aboo has hitherto failed as a Sanitarium except during the hot months of April, May, and June. In fact, it points out emphatically that malaria is generated around the oozy and marshy margins of the lake (Mukkee Talao), and in the undrained, spongy, and swampy ravines, which intersect the Hill in all directions—more particularly during those months when identically the same phenomenon is observed at every station on the plains below.

It may be contended that the convalescents bring up with them to the Sanitarium, not only fevers contracted elsewhere, but a strong predisposition to relapsing attacks. Nor can it be ques-

tioned that in some instances men do so arrive with the seeds of disease strongly implanted in their systems, and that in many cases there is a proclivity to recurrences produced by previous seizures, and the vital prostration consequent thereon. Still, admitting all these things, it must nevertheless be acknowledged that the foregoing table affords the strongest testimony in favour of the opinion that the portion of Mount Aboo inhabited by the soldiers is characterized by a well marked malarious, and non-malarious season.

The correctness of this view is further established by the revelations embodied in the subjoined statement, showing the prevalence of malarious fevers for 9 months among the men of a Detachment of H. M.'s 33rd Regiment, not composed of convalescents despatched thither for the restoration of their health, but of *effective soldiers* stationed here on garrison duty.

TABLE IX.

Months.	Strength.	Admissions with Fever.	Ratio per 1,000 of Admissions to Strength.
May 1860	80	4	50·0
June „	80	2	25·0
July „	80	1	12·5
August „	80	0	„
September „	80	4	50·0
October „	68	6	88·2
November „	67	13	194·0
December „	67	25	373·1
January 1861	67	22	328·3
Average.	72·1	77	1,079·7

There cannot be a doubt that almost every one of these 77 cases of fever were contracted here by malaria generated on the spot. The ratio of admissions to strength amounted in the 1,000—that is to say, that in an effective detachment the number of ague attacks exceeded the average number of men by 79·7 in the thousand.

A comparison of the results above exhibited with those comprised in Table VII., fully justifies the conclusion that by far the largest proportion of the fevers which prevail among the convalescents at the Sanitarium must be credited to local causes.

Ratio per 1,000 of admissions to strength among convalescents, *vide* Table VII	1,233·05.
Ratio per 1,000 of admissions to strength among the men of Detachment 33rd Regiment	1,079·70.
Difference attributable to previous attacks on the plains, and to predisposition.....	153·35.

Ponder these facts as we may, we cannot help admitting that the Hill climate of Mount Aboo, in its present neglected condition, is not only not curative of, but is not preservative against, primary invasions of ague, in those who have been cured, or in those who have never suffered from the disease in their lives before ! Fevers are less mortal, it is true, than on the plains, but their frequency interferes, or indeed negatives, the restorative powers of the climate, and neutralizes to a great extent the advantages of elevation : coolness of temperature of air, and water; purity of the latter; and freedom of the former from the scorching winds.

Let it however be borne in mind that malarious fever on Mount Aboo is susceptible of prevention, or at least, mitigation !

The following table which I have brought down one year later than those which Dr. Ewart's opportunities allowed him to compile, demonstrates in forcible language the truth of the foregoing, and also points out those months, where Mount Aboo in its present condition affords the greatest benefit as a Sanitarium. During the last two months enumerated in the table, *duty men only* have been presented, and yet a still greater amount of malarious fever is observed.

Table X.

Average of the undermentioned Months in the 5 years 1857-61 inclusive.	Average Strength.	Average No. of Fever Admissions.	Ratio of Fever Admissions to 1,000 Strength.
5 Januarys.	77·8	8·0	102·83
5 Februarys.	88·4	5·0	56.56
5 Marchs	95·4	3·2	33·54
5 Aprils	134·4	5·4	40·18
5 Mays	145·8	8·2	56·24
5 Junes	143·2	10·6	74·02
5 Julys	126·2	7·8	61·81
5 Augusts	136·0	8·0	58·82
5 Septembers	120·2	7·4	61·56
5 Octobers	101·8	21·4	210·22
5 Novembers	94·8	30·2	318·57
5 Decembers	88·0	21·8	247·73
Average	112·6	11·4	101·33

This table I considered so important in its signification that I took the liberty of forwarding it to the Deputy Inspector General of Hospitals, Northern Division, and also begged permission to record my opinion that soldiers should be sent to Aboo at the latter end of January, and allowed to leave before, or immediately after the first fall of rain in June, certain cases of course being excepted, at the instance of the Medical Officer.

III.—BOWEL COMPLAINTS.

G. Prevalence of Bowel Complaints at Mount Aboo, contrasted with that in the Bengal, Madras, and Bombay Presidencies.

Table XI.—*Exhibiting the Sickness and Mortality from Bowel Complaints among the Convalescents and Men of the Aboo Sanitarium during* 6 *years; among the European Troops in Bengal for* 21 *years; in Bombay for* 25 *years; and in Madras for* 10 *years.*

Station or Presidency.	Periods.	Strength.	Admissions.	Deaths.	Ratio per 1,000 of	
					Admissions to Strength.	Deaths to Strength.
Aboo.	1855 to 60	642	127	1	197·9	1·55
*Bengal.	1833 to 53-4	3,31,775	90,691	6·140	273·4	18·5
*Bombay.	1828-9 to 52-3	1,82,462	47,267	2·700	259·0	14·7
*Madras.	1842 to 1851	1,10,156	24,540	1·116	222·7	10·1

Thus, at Aboo, where choleraic diarrhœa has never prevailed epidemically, to swell the admissions from bowel complaints, *one-fifth* of the strength has passed through hospital on account of dysentery and diarrhœa combined. The prevalence, however, of these diseases is much less than the average among the European Troops in the Bengal, Bombay, and Madras presidencies. The mortality is also inconsiderable. The comparatively small prevalence of, and the insignificant Death-rage from bowel complaints, are to be explained, in great part, by the scrupulous care which has, generally, been exercised by despatching medical officers, whose main object has been to recommend for change of air and scenery to the Sanitarium, only such cases as,

* Ewart's Vital Statistics, p. 100.

according to the best of their judgment, were likely to be benefited by a residence thereat. Hence, all soldiers known or suspected to evince a strongly marked predisposition to, or to be labouring under, organic disease of the alimentary canal, or abdominal viscera, are not considered eligible subjects for removal to a climate characterised by coldness, great humidity, and an attenuated or diluted malarious taint during the monsoon: and by a more concentrated malarious contamination, great thermometric variations, during September, October, and November. Moreover, the medical officer in charge of the Sanitarium, immediately he satisfies himself that cases of this description are not receiving, or likely to receive, the desired benefit by prolonged sojourn on the hill, loses no time in advising their removal. "During the hot season," says Dr. Lownds, "diseases of the "stomach and bowels are not at all common; but, as might be "expected during the change to the rains, and during the rains, "diarrhœa is a common disease. In general, slight and easily "treated; but among those patients who have suffered from "dysentery to a considerable extent at other places, it must "occasion anxiety, as likely to produce a serious form of the latter "disease. I think I may, from two years' experience, say "decidedly, that such cases should not remain at the Sanitarium "during the south-west monsoon."* The cautious selection of appropriate subjects for transfer to Aboo, no less than the anxious solicitude of the officers responsible for their early restoration to health and efficiency, to retain those convalescents, and those only that are receiving palpable benefit by the change of climate and scenery, must be borne in remembrance, when the nominal mortality set forth in the foregoing table is taken into consideration. For, there cannot be a doubt that, if convalescents had been despatched from the plains, or retained on the hill, without the scrutinizing discrimination alluded to; or if men previouly prostrated by the fevers and fluxes consequent on harrassing War-service, and protracted residence at hot and

* Remarks on Mount Aboo: Bombay Trans., No. III., New Series, p. 173, 1855-56.

malarious stations, had been suddenly transported to the Sanitarium, a much higher ratio of mortality from bowel disorders, would have been demonstrated.

H. Effect of Season on the prevalence of Bowel Complaints.

Table XII.—*Exhibiting the effect of Season upon the prevalence of Bowel Complaints, among the Convalescents and Men at the Aboo Sanitarium.*

Months and Quarters.	Admissions.	Deaths.	Ratio per 1,000 of Admissions to Strength.	Months and Quarters.	Admissions.	Deaths.	Ratio per 1,000 of Admissions to Strength.
6 Januarys.	2	..	3·9	6 Julys.	22	..	28·7
6 Februarys.	2	..	5·2	6 Augusts.	17	..	23·6
6 Marchs.	6	..	12·7	6 Septembers.	32	..	43·7
6 Quarters.	10	..	22·0	6 Quarters.	71	..	96·2
6 Aprils.	2	..	2·5	6 Octobers.	7	..	10·2
6 Mays.	14	..	16·8	6 Novembers.	9	1	16·0
6 Junes.	11	..	13·7	6 Decembers.	3	..	6·8
6 Quarters.	27	..	33·4	6 Quarters.	19	1	33·8

Table XIII.—*Exhibiting the ratio of admissions with Fever and Bowel Complaints, during Quarterly periods, among the Convalescents and Men at Aboo, and the daily range of the Thermometer, Rain-fall, and the number of Rainy days during corresponding Divisions of the Year.*

Quarters.	*Fevers.* Ratio per 1,000 of Admissions to Strength.	*Bowel Complaint.* Ratio per 1,000 of Admissions to Strength	Temperature.	Daily Range.	Rain-fall.	No. of Rainy days.
6 Quarters January to March.	151·98	22·0	64·8	19·8	1·00	1
6 Quarters April to June.	137·54	33·4	77·7	14·9	4·29	10
6 Quarters July to September.	218·15	96·2	68·7	4·4	64·49	60
6 Quarters October to December.	803·52	33·8	67·8	18·4	..	..

During the quarter comprising the cold, frosty months of January and February, and the mild, comparatively cool, spring month of March, the convalescents and men are able to take abundance of exercise in the open air, at most periods of the day. Then, the admissions with bowel complaints amounted to 22·0 per 1,000.

April is the driest and least malarious month. May is characterized by dense morning fogs, and frequently raw moist winds. These continue more or less till the beginning of the rains, about the 20th of June, when the effect of the first good fall is to scour out the filth deposited (during the preceding eight months of the year) in and near the water-courses, and to give renewed vigour to vegetable growth, by which means putrifying organic mattter is oxidized and vitalized. During this quarter 38·4 per 1,000 of strength were attacked with bowel complaint.

During the very rainy months of July, August, and a portion of September, the admissions rose to 96·2 per 1,000; more men entered Hospital during this quarter with bowel complaint than during all the other three quarters of the year put together. The reasons of this are not difficult to explain. At this season if rain is not falling, the atmosphere is "dripping wet," the clouds are literally driven through the houses, bedewing every article of bedding and wearing apparel unprotected. Clothes, and boots, &c., unless repeatedly aired, and dried over a fire, remain damp, and quickly become mouldy: the walls of houses have to be protected externally, by grass work "tatties," and the interior kept dry by burning charcoal or the common fire-grate; the winds blow raw, cold, and chilly; the sun rarely penetrates with vigour, the dense vapoury masses enveloping the mountain; the atmosphere is contaminated by diluted malaria partly generated on the spot, and partly swept upwards from the numerous deep ravines communicating with the plains, and is also freely impregnated with animal and vegetable organisms; and it is almost impossible, in the absence of a well cultivated soldiers' garden, to obtain for the men a sufficient quantity of anti-scorbutic vegetables and fruit.

During the quarter embracing the rainless, cloudless, drying, months of October, the cold month of November, and wintry December, only 33·8 per 1,000 are noted as having been admitted into Hospital. But there is a fallacy here; a disturbing agency at work; which has artificially depressed the ratio of admissions. This is the season when 803·52 per 1,000 of the average quarterly strength, pass through Hospital, with one or other of the forms of malarious fever, and when the daily range of the temperature is 18·4. Partly therefore, to avoid this, but chiefly to benefit the convalescents, many are, at the commencement of this period, sent down the Hill, including of course all cases of flux which threaten to become serious or dangerous. Had this practice not existed, diseases of the bowels would have figured much more prominently than they do in the returns during the quarter under review.

Nearly all the causes which, according to Mr. Grant,* produced so much sickness and mortality from bowel complaint at Subathoo, Dughshai, and Kussowlie in the Sub-Himalayan ranges are in existence at the Aboo Sanitarium during the monsoon period—such as comparative coldness or depression of the mean temperature, malariousness, and great humidity.

The comparative coldness is demonstrated in Table XIII., from which it will be observed that the mean temperature during the rainy quarter is 9° lower than that of the hot season—in the latter the average temperature was 77·7, in the former 68·7.

The malariousness of the Sanitarium has been already evidenced, and may be again placed beyond question; for the ratio of the admissions with fever was 218·15 in the 1,000 in the *rainy* season when bowel complaint is most frequent; whereas they only amounted to little more than half that ratio during the *hot* season.

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* Grant "On Hill Diarrhœa and Dysentery," *Indian Annals Med. Science*, No. 1, p. 316.

The remarkable humidity during the monsoon period is also well shown, for during the three months there fell 64·49 inches of rain, and there were 60 rainy days.

Mr. Grant lays some stress on vicissitudes of temperature, as exciting causes of abdominal disease at the Himalayan Sanitaria before referred to; nor can it be doubted that where great ranges of temperature exist, in conjunction with other causes mentioned, these vicissitudes must increase the proclivity to, and the severity of, intestinal disease.

But at Mount Aboo the average range is less during the monsoon than at any other season. From July to September it amounts to 4·4°, whilst from October to December, when the humidity is greatly diminished, it reaches 18·4°, and from April to June it amounts to 14·9°.

Mr. Grant also considers that a scorbutic taint of the constitution which may exist without visible affection of the gums is an important predisposing cause; where this deteriorated condition of the blood does exist, it must not only facilitate the encroachments of bowel complaints, but increase their virulency, and lessen the chances of recovery from the more serious forms. As officially brought to notice on several occasions, the scorbutic diatheris is engendered on Mount Aboo, by a not sufficiently diversified diet, both as regards the animal and vegetable constituents.

Superadded to all these agencies must be mentioned the impregnation of the atmosphere during the monsoon, with animal and vegetable organisms. It is not at all improbable that bowel complaints are in some degree dependant upon the ingress of these into the alimentary canal. Drinking water contaminated with organic matter—and much of the water is so polluted in the rainy season—may also be alluded to as a probable cause of diarrhœa and dysentery. That this may be the case at Mount Aboo, in the absence of scavengers, is certainly not a far-fetched idea.

I. DYSENTERY.

I. Prevalence of Dysentery at Aboo, contrasted with that in the Bengal, Madras, and Bombay Presidencies.

Table XIV.—*Exhibiting the Sickness and Mortality from Dysentery, among the Convalescents and Men at the Aboo Sanitarium during* 6 *years*; *among the European Troops in Bengal during* 21 *years*; *in Bombay during* 25 *years*; *and in Madras during* 10 *years.*

Stations or Presidencies.	Periods.	Strength.	Admissions.	Deaths.	Ratio per 1,000 of	
					Admissions to Strength.	Deaths to Strength.
Aboo ..	1855 to 1860	642	45	1	70·0	1·55
* Bengal..	1832 to 53-54	3,31,775	50,355	4,769	151·7	14·3
* Bombay.	1828-9 to 52-53	1,82,462	25,587	2,348	129·2	12·8
* Madras.	1842 to 1851 [a]	1,10,156	13,151	922	119·0	8 0

If the previous observations regarding the careful selection of cases for transportation to, and the speedy return of, all those for which the climate appears unsuited, from Aboo, be recollected, the comparative infrequency of, and small mortality from, dysentery, will be intelligible enough. There is none of that delay in procuring carriage, providing adequate shelter, and medical aid for the journey to or from the hill, which, at one time marred the utility of some of the Bengal Sanataria. As a general rule, patients convalescing from dysentery, at any of the stations of Gujarat or Rajpootana, are not sent to Aboo, but to the sea-coast, experience having proved long ago, that they derive more benefit from a charge of this kind, than from removal to a hill climate; and not only so, but when a soldier contracts dysentery for the first time, or sustains a relapse of an old dysentery at the Sanatarium, it has been discovered that speedy transfer to the plains or to the coast, offers a far better chance of recovery, than retention on the hill.

[a] Ewart's Vital Statistics of the European and Native Armies in India, p. 93.

ACUTE AND CHRONIC DYSENTERY.

J. Relative prevalance of Acute and Chronic Dysentery.

Table XV.—*Exhibiting the prevalence of Acute and Chronic Dysentery, among the Convalescents and Men at the Aboo Sanitarium during* 6 *years.*

Type.	Period	Strength.	Admissions.	Deaths.	Ratio per 1,000 of Admissions to Strength.	Ratio per 1,000 of Deaths to Strength.
Acute Dysentery.	1855-60	642	33	1	51·40	1·55
Chronic Dysentery			12	..	18·69	....

We learn from this table that acute dysentery has been nearly three times as frequent as the chronic form of the disease.

K. Effect of Season on the prevalence of Dysentery.

Table XVI.—*Exhibiting the effect of Season on the prevalence of Dysentery among the Convalescents and Men at the Aboo Sanitarium.*

Months and Quarters.	Admissions.	Deaths.	Ratio per 1,000 of Admissions to Strength	Months and Quarters.	Admissions.	Deaths	Ratio per 1,000 of Admissions to Strength.
6 Januarys ..	2	..	3·9	6 Julys	3	..	3·9
6 Februarys .	2	..	5·1	6 Augusts ..	1	..	1·3
6 Marchs ..	4	..	8·5	6 Septembers.	19	..	25·9
6 Quarters ..	8	..	17·5	6 Quarters ..	23	..	31·1
6 Aprils	1	..	1·2	6 Octobers ..	4	..	5·8
6 Mays	1	..	1·2	6 Novembers .	4	1	7·1
6 Junes	3	..	3·7	6 Decembers .	1	..	2·2
6 Quarters ..	5	..	6·1	6 Quarters ..	9	1	16·0

The quarter ending September yields the largest number of admissions with dysentery (31·1 per 1,000); that ending March stands next (17·5); then follows the quarter ending December (16·0), and last of all that ending June which gives a ratio of 6·1 per thousand of strength.

2. DIARRHŒA.

L. Prevalence of Diarrhœa, at Aboo, contrasted with that in the Bengal, Bombay, and Madras Presidencies.

Table XVII.—*Exhibiting the Sickness and Mortality from Diarrhœa, among the Convalescents and Men at the Aboo Sanitarium during* 6 *years; among the European Troops in Bengal during* 21 *years, in Bombay during* 25 *years, and in Madras during* 10 *years.*

Station and Presidency.	Periods.	Strength.	Admissions.	Deaths.	Ratio per 1,000 of	
					Admissions to Strength.	Deaths to Strength.
Aboo.	1855 to 1860	642	82	....	127·72	....
* Bengal.	1833 to 53-54	3,31,775	40,336	1,371	121·5	4·1
* Bombay.	1828-29 to 52-53	1,82,462	23,680	352	129·7	1·9
* Madras.	1842 to 1851	1,10,156	11,389	194	103·0	1·7

Thus the prevalence of diarrhœa, at Aboo, has exceeded the average, among the European Soldiers of the Bengal and Madras Presidencies; and is only 1·98 per 1,000 below that which obtained in the European Army of Bombay.

* Ewart's Vital Statistics of the European and Native Armies in India, p. 98.

M. Effect of Season on the prevalence of Diarrhœa.

Table XVIII.—*Exhibiting the effect of Season on the prevalence of Diarrhœa among the Convalescents and Men at the Aboo Sanitarium.*

Months and Quarters.	Admissions.	Ratio per 1,000 of Admissions to Strength.	Months and Quarters.	Admissions.	Ratio per 1,000 of Admissions to Strength.
6 Januarys	..	....	6 Julys	19	24·77
6 Februarys ..	..	....	6 Augusts	16	22·22
6 Marches	2	4·25	6 Septembers ..	13	17·78
6 Quarters	2	4·40	6 Quarters	48	65·04
6 Aprils	1	1·26	6 Octobers	3	4·37
6 Mays	13	15·64	6 Novembers ..	5	8·91
6 Junes	8	10·02	6 Decembers ..	2	4·55
6 Quarters	22	27·27	6 Quarters	10	17·79

Diarrhœa therefore, like dysentery, prevails most abundantly during the monsoon quarter, 65·04 in the thousand having been admitted to hospital during that season.

IV. HEPATITIS.

N. Prevalence of Hepatitis.

Table XIX.—*Exhibiting the prevalence of Hepatitis among the Convalescents and Men at the Aboo Sanitarium during 6 years, as also the relative frequency of the Acute and Chronic forms of the disease.*

Forms.	Period	Strength.	Admissions.	Deaths.	Ratio per 1,000 of	
					Admissions to Strength.	Deaths to Strength.
Acute Hepatitis.	1855 to 1860	642	10	..	15·57	..
Chronic ditto..			29	1	45·17	1·55
Hepatitis.....	....	..	39	1	60·74	1·55

Chronic hepatitis is therefore almost *three times* as common as the acute form of the disease. Out of the 60·74 in the thousand that passed through hospital, 15·57 were acute, and 45·17 chronic cases.

O. Prevalence of, and Mortality from, Hepatitis, at Mount Aboo, contrasted with 19 other Stations of the British Army.

Table XX.—*Exhibiting the Ratios of Sickness and Mortality from Hepatitis among European Soldiers, at* 19 *Stations.*

Stations.	Period of observation.	Ratio per 1,000 of	
		Admissions to Strength	Deaths to Strength
Canada	20 years	7·5	0·1
Nova Scotia and New Brunswick	20 „	8·2	0·2
England	10 „	8·4	0·3
Jamaica	20 „	10·4	0·9
Gibralter	19 „	12·5	0·3
Corfu	10 „	13·6	0·8
Bermudas	20 „	14·3	0·5
Ionian Islands	20 „	16·6	0·8
St. Helena	9 „	19·0	2·6
Malta	20 „	20·9	1·1
Cape of Good Hope	19 „	21·8	1·1
Windward and Leeward Command	20 „	22·4	1·8
Ceylon	20 „	55·4	4·9
Bengal	42 „	60·2	4·1
Tenasserim Provinces	10 „	71·5	4·2
Bombay	51 „	79·3	4·0
Western Africa	18 „	81·3	5·9
Mauritius	19 „	82·1	3·9
Madras	20 „	89·2	4·0
Mount Aboo	6 „	60·74	1·55

Thus, out of the 19 stations above noted, 14 give a lower ratio of prevalence of, and 10 a lower ratio of mortality from hepatitis than Mount Aboo, at which Sanitarium this disease was actually more frequent in proportion to strength, than in the Bengal Presidency or Ceylon. This is the more remarkable, when it is remembered that men suffering from hepatic derange-

ments are *not* recommended to be sent to Aboo; because the cold, damp atmosphere, &c. of that place is not favourable to recovery for obvious reasons.

P. Prevalence of, and Mortality from, Hepatitis, at Mount Aboo, contrasted with those among Sepoys and Prisoners.

Table XXI.—*Exhibiting the ratios of Sickness and Mortality from Hepatitis among Sepoys and Prisoners in the three Presidencies.*

Presidency.	Class.	Periods.	Ratio per 1,000 of	
			Admissions to Strength.	Deaths to Strength.
Bengal	Sepoys.	1826 to 1852-53	1·0	0·07
Bombay		1803-4 to 53-54	1·8	0·19
Madras		1827 to 51-52*	1·2	0·13
Bengal	Prisoners.	1833 to 1854	1·39	0·15
Bombay		1831-2 to 1854	5·7	0·67
Madras		10 Years.	0·5	0·11

By a little calculation it will therefore be found that the proportion of sickness from hepatitis among Europeans at Aboo, as compared with Sepoys and Prisoners—

	E.	*S.*
Is in Bengal as	60	: 1
„ Bombay „	33	: 1
„ Madras „	50	: 1
	E.	*P.*
„ Bengal „	43	: 1
„ Bombay „	10	: 1
„ Madras „	121	: 1

* Exclusive of 1836—1837—1838—1839—1840 and 1841.

Again the proportion of mortality from hepatitis at Aboo as compared with Sepoy and Prisoners—

			E.	*S.*
Is in	Bengal	as	22	: 1
„	Bombay	„	8	: 1
„	Madras	„	11	: 1
			E.	*P.*
„	Bengal	„	10	: 1
„	Bombay	„	2	: 1
„	Madras	„	14	: 1

Hence we conclude that hepatitis has been 60, 33, and 50 times as frequent among Europeans at Aboo, as among the Sepoys of the Bengal, Bombay, and Madras Presidencies; that it has been 43, 10, and 121 times as common among Europeans as in the prisoners of the three Presidencies; that the mortality from hepatitis has been 22, 8, and 11 times higher among Europeans at Aboo than among the Sepoys of Bengal, Bombay, and Madras; and 10, 2, and 14 times greater than among the prisoners of the corresponding Presidencies. From a careful consideration of all the foregoing facts, it may be safely asserted, that Aboo is not a favourable refuge for those Europeans possessing a proclivity to, or actually afflicted with, organic disease of the liver.

Q. Effect of Season on the prevalence of Hepatitis.

Table XXII.—*Exhibiting the Distribution of* 39 *cases of Hepatitis in Quarterly Periods.*

Quarters.	Admissions.	Ratio per 1,000 of Admissions to Strength.
6 Quarters January to March	8	17·8
6 Do. April to May	17	21·0
6 Do. July to September	6	8·1
6 Do. October to December	8	14·2

This shows that hepatitis has been most prevalent during the hot months, and least abundant during the rainy season ; 21·0 per thousand are admitted during the former, and only 8·1 during the latter; 14·2 per 1,000 are treated during the quarter ending December, and 17·8 in that ending March. It is curious to note the infrequency of hepatitis during the rains. Does the diarrhœa, so common then among all classes of the community, act as a prophylactic by relieving the distention and congestion of the portal circulation ?

V. RHEUMATISM.

R. Prevalence of Rheumatism at the Aboo Sanitarium.

Table XXIII.—*Exhibiting the Sickness from Rheumatism among the Convalescents and Men at the Aboo Sanitarium during* 6 *years.*

Forms.	Period.	Strength.	Admissions.	Ratio per 1,000 of Admissions to Strength.
Acute Rheumatism....	1855 to 1860	642	16	24·9
Chronic Rheumatism..			57	88·7
Rheumatism	....	....	73	113·7

Out of a ratio of 113·7, 24·9 per 1,000 were acute, and 88·7 chronic cases of rheumatism. A large proportion of the chronic cases is of a neuralgic, or of a syphilitic character ; and ought under a correct system of nomenclature, to have been classified as "Neuralgia," or "Syphilitic Rheumatism." No death occurred under this head during the six years.

S. Prevalence of Rheumatism among the European Troops in the Bengal and Madras Presidencies.

Table XXIV.—*Exhibiting the Sickness and Mortality from Rheumatism among European Soldiers in Bengal and Madras.*

Presidency.	Periods.	Strength.	Admissions.	Deaths.	Ratio per 1,000 of	
					Admissions to Strength.	Deaths to Strength.
Bengal ..	1846-47 to 53-54	1,56,139	14,519	56	92·9	0·35
Madras ..	1842 to 1851	1,10,156	10,454	54	94·9	0·49

It follows, therefore, that the ratio of admissions with Rheumatism at Mount Aboo exceeds that of the Bengal and Madras Presidencies by 20·8 and 18·8 in the thousand, respectively.

VI.—VENEREAL COMPLAINTS.

T. Prevalence of Venereal Complaints.

Table XXV.—*Exhibiting the Sickness and Mortality from Venereal Complaints among the Men and Convalescents at the Aboo Sanitarium during six years.*

Period.	Strength.	Admissions.	Deaths.	Ratio per 1,000 of	
				Admissions to Strength.	Deaths to Strength.
1855 to 1860	642	67	2	104·3	3·1

The ratio of admissions with Venereal disease has, therefore, amounted to 104·3 in the 1,000; and of deaths to strength, to 3·1. Of the 67 cases noted above, fifty-one are recorded under the head "Syphilis," with one death; and 16 under the head Gonorrhœa, with one death.

U. Prevalence of Venereal Complaints among Europeans in Bengal and Madras, and in the Bombay 1st Fusiliers.

Table XXVI.—*Exhibiting the prevalence of, and Mortality from, Venereal Complaints among the European Troops in the Bengal and Madras Presidencies, and in the Bombay Fusiliers.*

Presidency or Regiment.	Period.	Strength.	Admissions.	Deaths.	Ratio per 1,000 of	
					Admissions to Strength.	Deaths to Strength.
Bengal	1846-47 to 53-54	*1,56,139	34,438	86	220·5	0·56
	1850-51 to 55-56	†	....	..	174·0	0·30
Madras ..... ‡	1842 to 1851	1,10,156	26,633	57	241·0	0·57
1st Fusiliers ..... §	1846 to 1853	7,406	1,943	1	262·2	0·13

Venereal Diseases are not half so frequent at Aboo as in the Bengal, Madras, and Bombay Presidencies, but they are common enough here, in the absence of "married regiments," to warrant the recommendation of the organization of periodical inspections of the bazaar women, or even the establishment of a "Lock Hospital" as preventive institutions of primary importance. So long as only 12 per cent. of the soldiers are allowed

* *Hugh Macpherson's* Analysis.

† *Chevers'* Indian Annals, Med. Science, No. xiii., p. 298.

‡ *Waring's* Vital Statistics of the Madras Army; Indian Annals of Medical Science, vol. V., p. 114.

§ *Arnott's* Report on the Health of the First Fusiliers; Bombay Med. and Phys. Soc. Trans., No. 11, New Series, p. 209.

to marry, well-regulated, well-organized, and well-conducted institutions of the kind should be established wherever European troops are located.

It appears that " Lock Hospitals " were first ordered to be established for the reception and cure of " Diseased Women" at Dinapore, Berhampore, Cawnpore, and Futtyghur in 1795, and that subsequently to this, they were formed at all stations throughout India, which were garrisoned by European Troops. In 1830 Lord William Bentinck, acting on the suggestion of the Medical Board, commanded their abolition, but it was not until 1835, that they were finally dispensed with in Madras, and perhaps also in Bombay. " An outcry," writes Deputy Inspector General Arnott, C.B., " was raised against them on account of " their supposed demoralising tendency, and some even argued " that instead of removing they increased the evil," and accordingly in 1835 they were abolished. Many of these " Lock Hospitals" were not well conducted, and the bazaars were badly attended to, but even under the worst management, it would be difficult to explain how they could increase the evil. The petty officials connected with them certainly took advantage of their position, and were often guilty of gross interference, and imposition ; but under better regulations these irregularities might be avoided.

The question of morality is one on which there will always be difference of opinion, but in its consideration it must be borne in mind that Government does not encourage marriage, and only allows 12 per cent. married men in each regiment, and that this is the root of the evil. The point to be considered is, whether it is better to preserve the soldier's health and efficiency, and to save the country from the loss of his services, under well-conducted and efficient establishments, or to let him be exposed to the effects of sun and climate, in seeking a gratification which entails disease and renders him useless to the state for months together, besides aiding the heat and malarious atmosphere inherent in the climate, in inducing that " Cachexia Loci " and systemic degeneration, which renders him an easy prey to

" epidemic constitutions of the atmosphere." There is not a better use to which the often times ample canteen funds could be applied. From these funds, under proper management, arrangements (which it is unnecessary to specifiy in detail) might be carried out, which would ensure protection from disease, and the preservation of the health of the men generally (*see* Arnott's Report on the Health of the Fusiliers, previously quoted).

Dr. Chevers writes, " We feel no shadow of a doubt, or moral " scruple in applying a well-regulated prophylaxis to syphilis— " while those who are wiser and more powerful than we are, " are engaged in elevating the character of our soldiery and our " populace above the instinctive frailty of humanity. We believe " that we have read carefully nearly all that has been written " upon the subject, and the result is a conviction that a well- " arranged and conducted system of preventing syphilis, will " always tend with certainty to repress prostitution." That it does lessen the consequences of promiscuous co-habitation is plainly demonstrated in the subjoined.

TABLE XXVII.—*Exhibiting the prevalence of Venereal Complaints among the European Troops in the Madras Presidency for* 20 *years* (*arranged in Quinquennial periods*).

Periods.	Strength.	Admissions.	Deaths.	Ratio of Admissions per 1,000 of Strength.	Remarks.
1829 to 33	54,559	7,992	20	146·4	Lock Hospital.
1834-38	48,871	13,448	43	275·3	No Ditto.
1842-46	61,234	11,503	30	187·8	Ditto.
1847-51	48,919	15,130	27	309·0	Ditto.

Hence it may be concluded that during 1829-1833, when even a wretchedly-managed Lock Hospital existed in each station held by Europeans, the ratio of admissions per 1,000 was 146·4, little more than half that of the succeeding quinquennium,

during four years of which, Lock Hospitals had been abolished. During 1842-1846 the ratio fell to 187·8, but in 1847-1851 it rose to the high figure of 309 in the 1,000.

VII.—OPHTHALMIA, BRONCHITIS, PLEURITIS, PNEUMONIA, PHTHISIS, AND OTHER DISEASES.

V. Prevalence of Eye and Chest and other Diseases.

Table XXVIII.—*Exhibiting the Sickness and Mortality from Eye and Chest, and other Diseases among the Convalescents and Men at the Aboo Sanitarium during 6 years.*

Periods.	Diseases.	Admissions.	Deaths.	Ratio per 1,000 of	
				Admissions to Strength.	Deaths to Strength.
1855 to 1860.	1. Ophthalmia ..	16	1	24·9	1·55
	2. Bronchitis	15	0	23·3	0·00
	3. Pleuritis	3	0	4·6	0·00
	4. Pneumonia	1	1	1·55	1·55
	5. Phthisis	5	3	7·7	4·6
	6. Other Diseases.	346	5	538·7	7·7

During the above period the admissions for Ophthalmia only reached 24·9 in the 1,000; Bronchitis yielded 23·3; Pleuritis 4·6; and Pneumonia 1·55; while Phthisis gave 7·9 admissions for 1,000 men. Phthisis is much less frequent but more fatal in proportion to given strength at Aboo than among the Europeans of the Bengal and Bombay Presidencies, but much more common and mortal than among the Sepoys and Native Prisoners in these dependencies. These facts are well brought out in the subjoined statement.

TABLE XXIX.—*Exhibiting the Admissions and Deaths for* 1,000 *strength amongst Europeans, Sepoys, and Prisoners in Bengal and Bombay during the periods mentioned.*

Caste.	Presidency.	Periods.	Ratio per 1,000 of Strength of Admissions with Phthisis.	Ratio per 1,000 of Strength of Deaths from Phthisis.
Europeans.	Bengal ..	1812 to 53-4	20·6	2·2
	Bombay .	1803-4 to 53-4	29·9	1·2
Sepoys	Bengal ..	1826 to 52-3	2·0	0·2
	Bombay .	1803-4 to 53-4	2·6	0·3
Prisoners ..	Bengal ..	1833 to 53-4	2·9	1·3
	Bombay .	1831-2 to 53-4	4·5	0·7

A diminution in the superincumbent weight of the atmosphere is sufficient in some instances to bring on hæmoptysis, as has been sufficiently demonstrated at Mount Aboo, in instances where men have come to the Sanitarium with diseased lungs, either with vomicæ, or studded with tubercular matter. It is very probable that removal from the heated air of the plains, to the twelve or fourteen degrees cooler atmosphere which exists on Mount Aboo in the hot months, has as great an influence in the excitation of hæmoptysis in the phthisical patient as the more rarified atmosphere. To these two exciting causes must be added also, the fog and damp of the monsoon season. The idea that "an ague in the spring is physic for a king," or that an intermittent is a cure for phthisis (being now exploded, although it has been entertained by some eminent authors), sending men to Aboo who have any predisposition to chest affection *cannot be sufficiently deprecated.* The records show that many instances of this kind do not occur, but they also demonstrate that men have been sent up the mountain, both in an advanced stage of consumption, and with the disease but partially developed. Disease of the lungs if at all advanced cannot be mistaken by a tyro for aught else, and it cannot be too broadly made known that Hill Sanitaria are not fitting localities for those affected with pulmonary complaints.

TABLE XXX.—*Exhibiting the Weights of 26 men at the time of arrival and departure from Mount Aboo after a residence of one year on the Hill, more or less.*

No.	Length of Residence.	Weight on arrival.		Weight on departure.	
		st.	lb.	st.	lb.
1	Upwards of one year.	9	8	11	3
2	Ditto	8	11	8	12
3	Ditto	9	1	9	4
4	Ditto	8	10	8	8
5	Ditto	8	7	8	6
6	Ditto	9	3	9	1
7	Ditto	8	4	8	8
8	Ditto	9	6	9	4
9	Ditto	9	3	9	7
10	Ditto	8	11	8	9
11	Ditto	10	4	10	0
12	Ditto	9	0	9	0
13	Ditto	8	8	8	6
14	Ditto	9	3	9	0
15	Ditto	11	0	11	4
16	Ditto	9	12	9	0
17	Ditto	9	12	9	5
18	Ditto	10	0	9	8
19	Ditto	10	0	9	10
20	Not one year.	9	4	9	0
21	Ditto	7	13	8	1
22	Ditto	9	8	9	4
23	Ditto	10	4	9	5
24	Ditto	10	4	10	1
25	Ditto	8	7	8	10
26	Ditto	10	0	9	8

From this table we find that 10 men only out of 26 gained in weight during their residence at the Sanitarium, and only one man of these ten (No. 1 in the list) gained to any considerable extent; while some lost eight or more pounds, and although it has

been shown by Mr. Macnamara (of the Home Establishment) that sudden fattening among soldiers, is to be regarded with suspicion, still it may be taken for granted that when a body of men of the soldiers' ages *lose weight*, there must be something exerting a deleterious influence over them, either with reference to their diet, mode of life, or climate in which they exist.

The conclusions which may be drawn from the foregoing, appear to be those which it was stated would be attempted to be proved.

That preventible, or mitigable disease, is more prevalent on mountain ranges than it should be.

That the natural advantages of the climate are negatived by such prevalence of disease.

That such disease may be removed or mitigated by Sanitary arrangements.

That until such arrangements are carried out, the most we can expect from Hill Sanitaria is a refuge from intense heat during the hot months of the year.

ON THE PREVALENCE OF TYPHOID FEVER IN THE BOMBAY PRESIDENCY.

By JOHN PEET, M.D., F.R.C.P., Professor of Medicine, Grant College.

[Papers read September and December 1862.]

The attention which has been given during the last three or four years to the prevalence of typhoid fever in tropical countries, makes it desirable that additional facts should be recorded. Not that the experience of any one person will afford even an approximation to the immediate settlement of the question, but rather in the hope that the aggregate of a large number of separate and distinct observations will supply data, for ultimately placing it beyond the pale of controversy. Until the year 1854, as is well known, writers on tropical diseases either denied or ignored the occurrence of typhoid fever in the sense in which the term typhoid is now generally understood. Some* have in terms expressed their entire disbelief in the prevalence within the tropics of any form of specific or contagious fever, whilst others have passed the subject over without comment.† An attentive study of the works which were published about the end of the last or beginning of the present century on the diseases of hot climates will, to say the least, raise the suspicion that typhoid fever was occasionally met with and confounded with malarious fevers or other diseases. Thus, Mr. Annesley, in describing the post-mortem appearances in fever, states that "the duodenum jejunum and ileum, especially the duodenum and *termination of the ileum* very frequently are diseased on their mucous surface,

* Annesley on the Diseases of India, pp. 513-514.—Clinical illustrations of the Diseases of India, page 195.

† McKinnon on Public Health, Hygienic and Prevailing Diseases.

which is inflamed in patches, sometimes covered with a muco-purulent secretion, and *studded with small ulcerations, particularly the termination of the ileum.*"* Case ccxv. at page 477 of his large work would, no doubt, now be considered typhoid fever. It is headed "*Continued fever, inflammation of the bowels supervening* "*with peritonitis from perforation of the small intestine.*" The patient, an European soldier, was admitted with continued fever, of what duration is not stated. He was attacked with peritonitis and died seven days after admission. "On laying open the ileum "at its entrance into the cœcum, its internal and external coats "were found much inflamed, but the latter most particularly, "and two ulcers were observed, through which the contents "of the bowels had escaped." There is difficulty in tracing the progress of the symptoms, by reason of the treatment that was adopted, the patient having taken in seven days 1 emetic, 6 purgatives, and 140 grains of calomel; in addition to which 46 Madras leeches were used and 2 blisters applied.† Mr. Twining's insidious congestive fever of the cold season in Bengal,‡ in some of its characters, certainly resembles typhoid fever. Thus, the early symptoms were slight and obscure, of slow progress, and long duration. Delirium was common, and often of long continuance. The abdomen was distended and tense. All classes of persons were attacked, and those who lived in the best houses, and were but little exposed to the supposed cause of malarious fevers, were frequently affected. On the other hand, diarrhœa is stated to have been a rare symptom, and superficial ulceration of the mucous membrane of the small intestines was found after death in only a small proportion of the cases. The examples which Mr. Twining gives were so actively treated by

* Annesley on the Diseases of India, page 547.

† As an illustration of the treatment then thought proper, it is curious to observe that even these were not considered by Mr. Annesley sufficiently energetic measures. He says—"This case was treated by one of the Assistant Surgeons of the Regiment, and it is evident he had not a clear view of its nature and complications. Bleeding should have been used more decidedly from the commencement, but particularly on the evening of the 27th, when he first felt acute pain." Op. Cit. p. 479.

‡ Twining on the Diseases of Bengal.

blood-letting and drastic purgatives, as to lessen the value of any inferences that may be drawn from them. It is quite impossible, for example, to determine whether the looseness of the bowels, which was sometimes present, was due to the disease, or to the remedies that were given for its cure. As to the nature of this fever there has been much discussion. Mr. Twining himself says, with reference to the condition of the small intestines—"If more extended observations should "prove that these ulcerations of the small intestines exist "generally, in the cases which terminate fatally, and that such "a pathological condition is rarely met with, in the inspection "of subjects that have died of other descriptions of fever in "Bengal, I should be inclined to adopt the opinion of Dr. "Boot, that a peculiarity of the disease would be thus ascer-"tained, which combined with the exclusive prevalence of this "fever in the cold season, its insidious symptoms, slow progress, "and protracted course, attended with prolonged stupor and "delirium and the organic changes at its latter stages, might "establish a resemblance to some modifications of European "typhus, although the resemblance be not strictly correct in "all its details."* This very sensible remark was written by Mr. Twining twenty-seven years ago, and I am not aware of a single observation of any value having been made to settle the important question to which it relates. Was this typhoid fever or not? Dr. Goodeve thinks that it was—† Dr. Morehead that it was not.‡ Dr. Ewart, also, says that it is not at all reconcilable with the typhoid or typhus fever which he met with in the Ajmere Jail, nor, as observed in the present day, in the British and Continental hospitals.§ He lays stress on the success of the depletive treatment adopted by Twining, which would be homicidal in the cases seen by him. But, in truth, we do not know whether Twining's treatment was suc-

* Twining on the Diseases of Bengal; 1835, pp. 353, 354.

† Indian Annals, No. xi., p. 141.

‡ Disease in India, p. 65.

§ Indian Annals, No. vii., p. 65.

cessful or not; he nowhere gives us any statistics on this point, and if we are to disbelieve in the identity of diseases from a comparison of the treatment now, and thirty years ago, I fear our views of their diversity will be very extended. For reasons which have been stated, no very decided opinion can be given as to the exact nature of this fever. On the whole, however, from its insidious commencement, the tendency to depression, the duration of the delirium, the tympanitic abdomen, and the ulceration of the ileum sometimes observed, it appears to me more to resemble typhoid than any other form of fever. Twining, it is true, mentions that the bowels were more often constipated than loose, but this must refer to the early stage of the disease, or to the time when he commenced the treatment of it, inasmuch as he was in the habit of giving a purgative of some kind nearly every day, and, of course, could not know how much of the looseness of the bowels was due to the medicine, and how much to any disease of the small intestine, that might have been present.

Sir Ranald Martin* states that "natives of Bengal were daily brought into the Native Hospital at Calcutta, in the most advanced and neglected stages of this form of fever," (of 15 or 20 days' duration.) They had "tumid abdomens, and were in a "state of stupor, with tongues black and dry as charcoal." Many of them recovered under the most simple treatment. Quinine does not appear to have been given in these cases. He also says (p. 201) "This latter condition (ulceration of the "mucous digestive surface) I found to be very prevalent amongst "the labouring classes of natives, whom I had continually to "treat at the Native Hospital at Calcutta on account of neglected "fevers of 15 or 20 days' duration." Dr. Morehead, in the first edition of his work, expressed his belief that typhoid, typhus, and relapsing fevers were unknown in India,† but in the second edition‡ he qualifies this statement and admits the occasional

* Influence of Tropical Climates 1856, p. 202.

† Disease in India, 1st Edition, Vol. I., p. 20.

‡ Page 160.

occurrence of typhoid fever. Amongst the cases of fever recorded by Dr. Morehead, there are two (cases 199, 200) which were probably typhoid. Mr. Cornish, in a very excellent paper in the 8th No. of the *Madras Quarterly Journal*, gives the result of his examination of the cases of deceased officers, Civil and Military, in the Madras Pesidency, the deaths extending over a period of 12 years. Of the total deaths 62 were due to fever, 7 of these are believed to have been *certainly* typhoid fever, and several cases of *probably* the same disease were discarded because a *post-mortem* examination had not been made. Mr. Rankin mentions that he has gone over the post-mortem examination reports of the Regiment of which he has the medical charge—2nd Madras European Light Infantry—and that he has found undoubted evidence of the occurrence of fever attended with the anatomical characters which would now be held to be truly characteristic of typhoid fever.*

Without wishing to attach more weight than they deserve to the facts just stated, enough has, I think, been advanced to make it at least *probable*, that typhoid fever has at all times occasionally occurred within the tropics, and been confounded with remittent fever, or other diseases.

The first cases of typhoid fever, recorded as such, are by Mr. Scriven.† They happened in Burmah, and are three in number. One was an officer, the two others were European soldiers. None of these cases appear to me typical, and the diagnosis was founded chiefly upon the morbid appearances. In one indeed, no symptoms are recorded. These cases, with three others, are included in a paper on Indian Fevers in the 8th No. of the *Indian Annals of Medicine* (p. 511). In one of the latter cases there is merely the statement that the patient was admitted delirious, and with fever far advanced. But in one case the symptoms were traced throughout and were very character-

* Madras Quarterly Review.

† Medical Gazette, January 28th, 1854.

istic—the rose-coloured spots being quite distinct. The post-mortem appearances were equally well marked. That this was typhoid fever there can be, I think, no reasonable doubt. In the 7th No. of the *Indian Annals* (p. 72), four cases of so-called typhoid fever, are recorded by Dr. Ewart as having occurred in the Ajmere Jail; three were fatal, and in each a post-mortem examination was made. In all there were ulcers in the ileum. The rose-coloured spots were not seen, and Dr. Ewart thinks they are not generally visible in the natives of India. Mr. Greenbow in his report of the health of the garrison during the siege of Lucknow, describes a low form of typhus (typhoid?) which was not uncommon both amongst Europeans and natives. He details one case—a fatal one—in which the symptoms of typhoid fever were well marked, but no post-mortem examination was made. Dr. Goodeve has published in the XIth number of the *Indian Annals* (p. 141), a Clinical lecture on typhoid fever, in which the subject of its occurrence within the tropics is very ably discussed. He states that the twenty-one day or three-week fever is well known to unprofessional persons in Bengal; that he has seen cases of what he is certain were "typhoid fever" in persons under 30 years of age, amongst the European, East Indian and Armenian population, in Calcutta, and he is nearly sure that he has seen it amongst natives. Dr. Goodeve then details seven cases which he had met with in hospital and private practice. They were all European or East Indians—three of them were children—the rest under 30 years of age: none were fatal. Diarrhœa and a tympanitic abdomen were present in all: in two only was the rose-coloured eruption observed. All the cases were of long duration. Many other examples seem to have fallen under Dr. Goodeve's notice. In the last *Madras Quarterly Journal of Medical Science* there are two papers on typhoid fever—one by Mr. Rankin, the other by Mr. Cornish. Mr. Rankin relates six cases, two of which were fatal. In these, ulcers were found in the ileum—the rose-coloured eruption was observed in three of the cases. Mr. Cornish details two cases of typhoid seen by himself, which appear to have been well marked; and then relates seven cases from the records in the office of the Principal

Inspector General. They were all fatal, and in all, ulcers were found in the ileum: the rose-coloured eruption was not noticed in any of these seven cases. But in my judgment, the most valuable report upon the subject of typhoid fever in India, is by Mr. Hanbury, of H. M.'s 33rd Regiment.* The cases recorded by him occurred whilst the regiment was stationed at Deesa, and were thought to be traceable to defective sanitary arrangements.

My attention was first directed to the occurrence of typhoid fever in Bombay, in the year 1859. In January of that year, I was asked by Mr. Merwanjee Sorabjee, a graduate of the Grant College, to see a Parsee girl, about 12 years of age, suffering, it was said, from looseness of bowels, which was supposed to depend upon intestinal worms. The child was emaciated, the skin hot, dry, and harsh, the abdomen tympanitic, the tongue florid, and the pulse above a hundred. There were about four copious feculent stools, in the 24 hours, unmixed with mucous or blood. I was told that the child had been ill three weeks, that the disease came on with fever and looseness of bowels, and that the stools at first contained blood. There were imperfect remissions of the fever during the first few days of the attack, when quinine was freely given, but without effect. Latterly, these remissions were less distinct; indeed, the fever was described as continued,—the pulse rarely falling below a hundred. There was daily loss of strength after I saw the patient, and death occurred in about a week from asthenia; the duration of the attack having been in all about twenty-eight days.

The febrile symptoms were out of proportion to the local derangement, and, therefore, I concluded it was not a case of muco-enteritis; the appearance of the evacuations was opposed to the idea of its being dysentery. That it was not remittent fever seemed evident, from the imperfect nature of the remissions, the failure of quinine, and the long duration of the

* Transactions of the Medical and Physical Society of Bombay, No. VII., New Series, p. 144.

disease. Then in favour of its being typhoid fever there was the persisting diarrhœa, the tympanitic distension of the abdomen, and the slow progress of the disease. The symptoms absent, or not noticed, were the rose-coloured eruption, the tenderness and gurgling of the abdomen, deafness and delirium. Some of these symptoms may have been present and not noted; indeed my notes of this case are very meagre, and I do not by any means wish to adduce it as a typical example, but merely allude to it as the case which first led me to believe, that typhoid fever might prevail in Bombay. A few weeks after this child died, I saw with Mr. Carvalho, in the same house, a young man suffering from fever and diarrhœa. There, also, the febrile symptoms predominated, but the diarrhœa was persistent. I had not an opportunity of watching this case throughout its progress: the result was fatal. During the year 1860, I saw with the Graduates of the Grant College several cases of, what I believed to be, typhoid fever, but my visit was often a single one, and although I may have seen enough to satisfy my own mind, it cannot be expected that such cases would be satisfactory to others; I do not, therefore, use them. The first *typical* case, which I had an opportunity of watching during a considerable part of its course occurred in the year 1861.

Case 1.—C., aged 11, a delicate looking boy, son of a Parsee gentleman residing at Mazagon, first seen with Mr. Ardaseer Jamsetjee, on the 18th July 1861. "Face pinched, and dull in expression, lips dry and parched. Is very deaf; skin hot, dry and harsh; pulse 110, easily compressible; tongue moist and florid; bowels loose and copious, pea-soup looking evacuations. Abdomen swollen, tympanitic and tender in left iliac region; no gurgling, no eruption on the skin." I learnt that he had been ill 18 days; that the looseness of the bowels and fever came on at the same time; that the stools had at first a dysenteric appearance and that the fever was continuous. There was no delirium, but he never spoke unless spoken to, and never asked for food but took readily enough what was given to him. Quinine had been freely administered during the first week of the attack. For the first five days after I saw him, there was but little change; there was neither remission nor exacerbation of the fever; the pulse ranged between 110 and 115. He passed about three or four stools in the 24 hours, copious and of a pea-soup appearance. The abdomen continued as tympanitic and as

tender. On the morning of the 23rd July several rose-coloured spots were observed on the forehead. On the following day they were gone, and did not return, and no others made their appearance; 4 days after this (July 27th) he became drowsy, the pulse was 108, and had lost strength. A blister was applied to the nucha, which seemed to remove the drowsiness; but the night of the 28th was passed with much restlessness, and a good deal of muttering delirium; the stools were more frequent and of the same character, and the tympanitic distension of the abdomen greater. Six minims of turpentine were given every third hour. On the 30th there was less febrile heat, and he sweated at times, but the pulse had risen to 118. There was no drowsiness, and the bowels continued loose. From this time he began slowly to improve; the skin became cool; the appetite returned, and the looseness of the bowels very gradually diminished. The pulse, however, did not fall much in frequency. It continued over 100 for many weeks. The convalescence was much prolonged, and it was nearly two months after the fever left him before he was restored to health. This young gentleman is now in England.

Remarks.—There are several points in this case, which are worthy of notice: 1*st*—*The long duration of the symptoms.* From the commencement of the attack, viz. about the 1st July, until the first sign of amendment, 30 days elapsed; this is about the usual period, when in severe cases of typhoid fever a favourable change may be looked for. 2*nd*—*The long convalescence.* This also accords with what is observed in typhoid fevers. 3*rd*—The deafness, the apathy, the slight delirium, the absence of anything like a perfect remission, the florid tongue, are symptoms which are consistent with its being typhoid fever. 4*th and lastly*—What may be considered the pathognomic symptoms were present, the tympanitic distension of the abdomen, the persistent diarrhœa, and the rose-coloured spots.

I attended with Mr. Bhawo Dhajee in the early part of the present year a cousin of the above (but not living in the same house or neighbourhood) with very similar symptoms. About the 21st day of the disease, the patient (a boy about 13 years of age) became drowsy and comatose; dyspnœa followed, and he died in a few hours. I regret that I have mislaid my notes of this case.

Case No. 2.—Mr. K., European, aged 23, employed in a druggist's shop in the Fort, where he was resident. I saw this case with Dr. Hunter, January

29th, 1862. The patient had been ill three weeks, but about seven days after the attack he appeared to be convalescent, and continued free from fever for eight or ten days. He then had a relapse, and the fever was more or less continuous and attended with looseness of the bowels. He was stated to be delirious at night, and not quite rational in the day. When seen by me, the skin was a little above the natural heat, the pulse 118, small and easily compressible, the tongue dry and red, and the lips parched and cracked. The face was dull in expression, and he did not apprehend what was said to him very readily, but there was no deafness. The abdomen was much distended, very tympanitic and tender in the right iliac region, but there was no gurgling. The bowels were stated to be loose, and the stools copious. Upon the front part of the abdomen, 15 rose-coloured spots were counted. They were a little raised above the surrounding skin and disappeared on pressure, but immediately returned on the pressure being removed. They measured from about half a line to a line in diameter. I did not see this patient again, but Dr. Hunter has favoured me with the following note:—"I was first called to Mr. K. on the 2nd January. He had been feeling unwell for a day or two, and complained of pain in the back, a general sense of uneasiness, disturbed sleep, and loss of appetite. The tongue was coated. Three or four days after, fever set in with bilious derangement, depression, and a dryish coated tongue. These symptoms subsided in about four days, and convalescence appeared to be established; but on the 22nd January there was a relapse, the skin became warm, dry and harsh, the tongue dry and brown, and sordes collected about the teeth. The face was flushed; there was extreme apathy, muttering delirium at night, and a constant tendency to slide towards the foot of the bed. Pressure of the abdomen, particularly in the right iliac fossa, caused the patient to flinch. The bowels were loose, evacuations varying in colour, and fœtid. On the 29th an eruption made its appearance over the body, especially over the abdomen, rose-coloured, raised, becoming pale but not entirely eradicated by pressure. On the 3rd February the eruption had disappeared. On the 7th there were profuse fœtid, dark, grumous looking evacuations, after which the improvement was steady and rapid."

Remarks.—This seems a typical case: 1st—*The slow and insidious invasion.* 2nd—*The relapse which is so often observed in typhoid fever as to be almost one of its characteristics.* 3rd—*The persisting diarrhœa,* the *tympanitic distension* and *tenderness of the abdomen.* 4th—*The long duration* (more than 30 days) *of the fever.* 5th—*The well-marked rose-coloured eruption.*

Case No. 3.—Miss D'C., aged 15, Portuguese, resident at Kalbadavie. First seen with Mr. Lisboa, a Graduate of the Grant College, on the 1st

February 1862, when the following account was given of her illness. After six or seven days' lassitude and loss of appetite, fever came on without shivering or chills, and was more or less continuous with perhaps a very imperfect remission in the morning, of which advantage was taken, and quinine freely given for two or three days without effect. The bowels were easily acted upon by aperients, there having been four or five copious stools after one drachm of sulphate of magnesia had been given. When I saw her, she appeared dull and apathetic and could not be made to answer questions, and only with difficulty to protrude the tongue, which was moist, florid at the tip and edges, coated and white in the centre. The skin of the trunk was above that of the extremities, below the natural heat. The pulse was 130, small and easily compressible. The abdomen was tympanitic, and tender in the right iliac region; there was no gurgling. An eruption was carefully looked for but not found. She was said to be at times delirious. On the following day she became collapsed and drowsy, and partially comatose, but was roused by a blister to the head, application of heat, and use of stimulating enemata. Two days after this, I again saw her; she was then sensible, but dull and slow in answering questions: the tympanitic state of the abdomen continued, and the bowels were loose, the evacuations being feculent, of a yellow colour, without mucous or blood. I did not again see her until she was convalescent, but was informed by Mr. Lisboa, that several days after my last visit she gradually began to improve; the skin became cool, the bowels more quiet, and the appetite returned.

Case No. 4.—F. A., Portuguese girl, aged 11; seen with Mr. Mosquito, a Graduate of the Grant College, July 14th, 1862. She had been ill seven days with fever, (continued) and purging; the stools were described as being copious and of a yellowish colour. Quinine had been given. When I saw her she was deaf and delirious; the skin hot and dry; the pulse 120, small and easily compressible; the tongue dry, and the abdomen tympanitic and tender. There was no eruption,—it was carefully looked for. I did not see her again, but Mr. Mosquito informed me that she became weaker, the purging continued, the low muttering delirium passed into drowsiness, followed by coma, and death two days after I had visited her.

Case No. 5.—Abdool Kurreem, age 18, was admitted into the Clinical Ward Jamsetjee Jejeebhoy Hospital on the 2nd February 1862, said to have been ill with fever, more or less continuous for 15 days. There was neither diarrhœa nor tympanitic distension of the abdomen. After his admission he became delirious and violent, then drowsy and comatose, and died the day after admission.

Post-mortem appearance.—Left lung consolidated from fibrinous effusion; the lower part of the ileum of a dark colour externally. On opening the intes-

tine, Peyer's glands were found to be extensively diseased. The lower patches were ulcerated, those a little above had a sloughy appearance, and patches still higher in the intestine, were congested and swollen.

Besides these cases I have seen others where the symptoms of typhoid fever seemed to me sufficiently marked to warrant that disease being diagnosed; but, as before explained, my opportunity of watching these cases was not such as to justify me in recording them.

Diagnosis of Typhoid Fever.*

It may be stated with confidence that there is no one symptom, the absence of which in itself invalidates the existence of typhoid fever. The diagnosis rests upon a consideration of the symptoms as whole, on the mode of commmencement, the progress and duration of the attack, and the long convalescence. The rose-coloured eruption, which Dr. Jenner seems, to have very generally noticed in persons under 30 years of age is now well known to be frequently absent. Often overlooked, it cannot, even when carefully sought for, always be found. Dr. Peacock states that out of 71 cases, it was unmistakably present in 50 only, having been absent in nearly one-third of those observed.† I cannot indorse the opinion that the rose-coloured spots would not be visible in natives,‡ nor that they might readily be mistaken for flea-bites or prickly heat.§ Their elevation above the skin, their change of colour on being pressed, the absence of any central distinctive point either of colour or acumination, their situation and evanescence, are to my mind, sufficiently characteristic to render their recognition a matter of

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* There can be no question that the use of the term typhoid has been an obstacle to correct diagnosis. Typhoid or dynamic symptoms are perhaps as common in remittent as in typhoid fever so called, and if this is overlooked and undue weight given to them, the prevalence of the latter will be exaggerated. On the other hand, if no case of fever is to be considered "Typhoid," in which these symptoms are absent, our estimate of the relative frequency of this form of fever will be too limited.

† Medical Times and Gazette, 1856, Vol. II., p. 56.

‡ Indian Annals, No. vii., p. 65.

§ Transactions Medical and Physical Society of Bombay, No. viii., New Series, p. 144.

no difficulty.* Whether there is ground for believing that the eruption is a less frequent accompaniment of typhoid fever in this country than elsewhere, must be left for further investigation. Admitting the presence of the eruption as an important positive sign in diagnosis, its absence has little negative significance. The condition of the abdomen affords, perhaps, more reliable information. Tympanitis appears to be rarely absent, and gurgling and tenderness in the right iliac region are generally present. Looseness of the bowels is a very variable symptom; sometimes, it has so much prominence as to fix the attention upon the abdomen and lead to the belief that dysentery or diarrhœa, is the primary, or perhaps, only disease; at other times the bowels have been regular or constipated, and this, when a post-mortem examination has revealed very considerable disease in the small intestines. Much weight should be given to the attitude and expression of the patient, and the state of the mind, &c. The decubitus on the back, the dull and apathetic expression of face, the unwillingness to engage in conversation, though questions are readily answered, the dry parched lips, the occasional delirium, the deafness, are, taken together, very characteristic of the disease; and when the attack is slow and obscure at its commencement, has resisted quinine in full periodic doses, and has a duration of from twenty-five to thirty days, very little doubt need remain of the disease being typhoid fever, notwithstanding that the eruption is absent, and the abdominal complication little marked. My own belief, however, is that the cases are very exceptional in which with the symptoms just stated, the abdomen is not tympanitic, and the bowels, if not loose, acted upon by far too readily by even the mildest aperient. The mode of commencement of the attack is certainly different from that of the malarious fevers. From the first sign of deranged health, many days often elapse before the febrile symptoms are developed. In remittent

* The remark that "the rose-coloured eruption cannot be seen through the dark-coloured layers of the native integument" would not apply to Parsees in Bombay, and yet in this class of persons I have very rarely seen it; but this may have arisen from my opportunities of watching for it having been few.

fever, on the contrary, the attack is often sudden and the symptoms well marked within a few hours ; and in like manner these fevers are equally dissimilar as regards their duration, and the period of their convalescence. Remittent fever lasting for twenty-five or thirty days, has been in my experience an unusual occurrence, and when thus prolonged recovery very rarely observed.

As regards the morbid anatomy of typhoid fever, it is of much interest to determine the importance that should be attached to ulceration of Peyer's glands. It is well ascertained that the amount of ulceration and the febrile symptoms are in no way related. In the worst cases, when death takes place at an early period, the evidence of glandular disease is very slight. But the question of most importance to be determined is, the weight that should be given to such ulceration as a positive or exclusive sign. Some writers appear to view it when febrile symptoms have been present as absolute proof of the previous existence of typhoid fever, and in many of the cases recorded, as having occurred in India, the diagnosis was founded upon this morbid appearance. Others, again, believe it to be a common pathological change. Morehead states* that turgescence or ulceration of Peyer's glands occurs in cholera, in protracted diarrhœa, in acute muco-enteritis, as an occasional complication of remittent fever, and a frequent one of phthisis pulmonalis. Putting out of consideration phthisis and dysentery, my belief is that Peyer's glands are seldom ulcerated in the diseases of tropical countries. Comparatively few cases are recorded, and in my own experience, I have rarely observed it, except in connection with the diseases just mentioned. This observation, if true, is calculated to negative the frequent occurrence of intestinal complication in remittent fever, as, from the mortality, and frequency of this form of fever in India, ulceration of Peyer's glands should be a common, in place of being a rare, phenomenon. It is true that from time to time, cases of so-called remittent fever are

* Researches on Disease in India, p. 161.

recorded, in which glandular ulceration is noticed. Some of these cases, however, more nearly resemble typhoid than remittent fever. But whilst I am quite satisfied that Peyer's glands are rarely ulcerated in malarious fevers, I am not prepared to assert that they never are. Further investigation upon this point would seem to be required, and in the meantime, the existence of such ulceration, in connection with fever, should lead to a very careful inquiry into the symptoms, mode of invasion, and progress of the case during life. The rarity of enteric ulceration in tropical fevers, tends to show that if typhoid fever does exist, it is either an uncommon, or at all events not a frequently fatal disease: at the same time it must not be overlooked that fatal cases of typhoid fever are met with in which, should death have taken place in the early stage, the glands may not present any appearance of ulceration, and but little of turgescence. The inference to be drawn from the negative facts just stated, is not that typhoid fever is unknown in this country, but simply that it is not often fatal in the advanced stage.

Lastly, it is important to remember that there is not the marked distinction, in tropical countries, between *remittent* and *continued* fevers, which their designation would imply. The sympathetic fever in compound fracture or other severe injury, is often as distinctly remittent as is that which results from malaria. This has been so frequently observed by my colleagues and myself in the Jamsetjee Jejeebhoy Hospital as to be quite certain. Whatever the influence may be which favours remissions in sympathetic fever, it is more than probable that it will be equally operative in giving a remittent character to fevers, which in other countries would be of a continued type. Hence, in this country one of the distinctive characters between fevers of the remittent and continued type is wanting, and this increases the difficulty of diagnosis between typhoid and the malarious fevers, and renders it necessary that every circumstance in the history and progress of the attack should be fully weighed.

Prevalence of Typhoid Fever in the Bombay Presidency.

Assuming that the facts which have been recorded are sufficient to place the occasional occurrence of typhoid fever beyond reasonable doubt, it may be of interest to inquire to what extent it prevails in the Bombay Presidency. The nominal returns of diseases from hospitals throw no light on this point, as there is no heading in them, by which typhoid may be distinguished from other fevers. It occurred to me, however, that it might be sometimes returned under other headings, and that it was, consequently, desirable to examine the diaries of the cases, and the records of post-mortem examinations, forwarded by medical officers, to the head of the Medical Department. By the kind permission of the Principal Inspector General, I have been permitted to read over the fatal cases received in his office during the last 3 years, of officers, Europeans soldiers and sailors, and patients in the European General Hospital. They amount in all to 692, viz. 54 officers, 288 soldiers, 40 sailors, and 310 inmates of the European General Hospital. From amongst the former, the following case (summarised) is the only one, which bears any close resemblance to typhoid fever.

Ensign ———, age 19½ years; 2 years in India; 31st Regt. N. I., Deesa; admitted 29th May, died 20th June.

Was first seen May 29th 1859, at 5 P.M. He had been feeling feverish for 2 days, but had attached no importance to it, beyond taking a few doses of saline medicine. When seen he was lying on his cot complaining of headache and thirst; the skin was slightly hot, but not dry, the tongue moist and a little coated in the centre, the bowels free, and the pulse excited (frequent). It was believed that he had exposed himself a good deal to the sun, walking about without his hat. Salines were given, and on the morning (May 30th) 4 grains of quinine, which were repeated every 3 hours, until 3 P.M., when a febrile exacerbation came on. At 5 P.M. the fever was said to be going off. The bowels had been moved three times during the day. The tongue was red at the tip, coated in the centre; the pulse not so full as the day before; the skin hot and slightly moist. There was no nausea, nor abdominal tenderness. He complained of throbbing pain in the temples, and of thirst. Leeches were applied to the temples, and the quinine continued. On the following evening he felt better, the febrile exacerbation having been slight, but he complained of giddiness on attempting to move. The bowels continued loose.

The quinine was repeated. On June 1st he had a slight febrile accession, and he still complained of much giddiness. On the following day he is described as doing well, and until the 8th he appears to have had but little fever, but his bowels continued loose and he gained no strength. On the evening of the 8th he was suddenly seized with severe pain and tenderness of the abdomen a little above the symphisis pubis; this was preceded by profuse purging. On the following morning the skin was somewhat cold and the pulse feeble. By the use of fomentations and turpentine stupes the pain was somewhat relieved, but the abdomen became tympanitic, and nausea and vomiting set in. On the 11th the tongue was dry and coated; abdomen much distended and tender; pulse feeble (about 72?); aspect sunk and anxious; bowels not loose. The night of the 11th was passed in quiet sleep. On the following day, the pulse was 96; tongue dry and florid at the tip and edges. The abdomen was much distended from tympanites. During the day he vomited frequently, and in the evening the skin became cold and clammy, the pulse rising to 108. For several days there was but little change in his symptoms. On the 14th he was thought to be a little better. On the 16th the abdomen is said to have been softer but still tympanitic, and on moving from side to side a gurgling sensation was felt. The tongue was somewhat coated and dry. A bad sore had formed on the right hip and shoulder, and another was forming over the sacrum. On the 20th the pulse was rapid and feeble (114), abdomen tympanitic; bowels had been irregular for some days, sometimes two or three stools and then none until an aperient or enema had been given. On the 21st had passed a very restless night, was troubled with dyspnœa and palpitation, which were attributed to the tympanites having increased so much as to encroach upon the chest. The pulse was 120 and very feeble. He died at 6 A.M. of the 22nd June—a large quantity of stercoraceous matter having been vomited just before his death.

Inspection.—General adhesions of the convolutions of the intestines by lymph effusions; these were best marked near the lower part of the ileum. About 3 feet from the caput coli, several livid marks were observed on the peritoneal surface of the ileum, of a gangrenous appearance; these became more numerous towards the lower end. About 12 inches from the cœcum a slough was noticed, passing through the whole of the coats and permitting of the escape of fæcal matter. The mucous membrane of the large intestine was quite healthy.

The fatal cases of Soldiers and others occurred in the European troops of the late East India Company, serving in this Presidency, amongst the Soldiers of the Indian Navy, and the patients in the European General Hospital: they are distributed as follows:—

Artillery	114	Cases
Cavalry	11	„
Infantry	134	„
General Hospital	310	„
Indian Navy	40	„
Ordnance and Engineer Departments	11	„

I have been able to find 4 cases only which are sufficiently well marked to entitle them to be recorded : they are summarised below.

Charles Dennett, age 28 years; 2 years in India; Private, 3rd European Regiment. Admitted into Hospital January 7th, died 14th January 1861.

He had been suffering from fever for three days before his admission, and when first seen complained of headache, and had a furred tongue : the bowels were not loose, and no tympanitic distension was noticed. On the day following his admission he was free from fever, when quinine was given in 3 grain doses; the next day he was also without fever, but on the day after that it returned and never left him up to the time of his death. The symptoms during this period were great uneasiness, restlessness, and delirium at night, looseness of bowels, a dry and furred tongue, sordes about the teeth, suffused eyes, hurried breathing and subsultus tendinum. No eruption is mentioned, nor is the state of the abdomen noted.

Inspection.—Nothing of importance observed in the head or chest. The small intestines were healthy except the ileum, in the mucous membrane of which, and in the cœcum, there was turgescence, with small patches of ulceration.

Remarks.—This case was returned as common continued fever. It appears to have presented many of the characters of " Typhoid," and if this is considered in connection with the state of the ileum, little doubt as to its nature will probably remain. If it was not typhoid fever it must have been " Remittent," but certainly no distinct remissions are noted in the diary of his case. Quinine was given in 5 grain doses and repeated every 3 hours.

John Cooper, age 20 years; 3 years in India; Private, 3rd European Regiment. Admitted 18th, died 26th May 1860.

A weakly looking lad, who had been for some time out of health without appetite, was admitted with fever which came on without rigors. On the day following his admission, there appeared to be a remission, when quinine was given, but the fever returned with diarrhœa, and the tongue became

parched and dry, and the pulse small and week. On the 25th he passed stools of a reddish-brown colour, from the presence of blood. On the 26th he rapidly sunk.

Inspection 2 hours after death.—There were crude tubercles in the left lung. At the lower part of the ileum there was a deeply excavated ulcer about the size of a crown-piece.

William King, age 23 years; 9 months in India. Admitted 21st July 1859, died 6th August 1859.

When admitted he was feverish and complained of pains of the limbs. After an emetic and purgative had been taken, the febrile symptoms subsided, and quinine was given, but the fever returned four days after admission, and gradually became more severe, with dry and brown tongue, restlessnes and delirium. On the 1st and 2nd August, the heat of skin was less, but the dryness of the tongue and the frequency of pulse continued. Diarrhœa set in on the 2nd August, and continued till his death. On the evening of the 3rd he was drowsy with a tendency to coma, but rallied from this on the following day. On the 6th there is the following note:—"Is much worse this "morning and in a low sinking state: bowels were moved three times in the "day, and the same number of times in the night, stools fluid, feculent, and "deeply tinged with blood. Has now wandering delirium—subsultus tendi-"num; small weak pulse, scarcely appreciable." In the evening of this day he became comatose, and died at 4 oclock the following morning.

Inspection 5 hours after death.—With the exception of some serum at the base of the brain, that organ, as well as the organs of the chest, were healthy. The liver and spleen were somewhat enlarged. At the lower part of the ileum, the mucous membrane was injected, and there were three dark excavated ulcers. There was no ulceration in the large intestines.

Remarks.—The post-mortem appearances were those usually found in 'Typhoid Fever,'—the symptoms were quite consistent with this view of the case, though one of the characteristic symptoms is not noted.

Samuel Florence, age not stated, Private 3rd European Regiment; 1 year and 6 months in India. Admitted 13th May, died 7th June 1860.

When admitted he is said to have had fever, which subsided after the action of an emetic and purgative, but returned in 9 or 10 days with looseness of the bowels. The skin is described as dry, and the tongue furred. There were four or five fluid feculent stools, and on two occasions they contained blood. Tenderness was felt in both iliac regions. Afterwards the tongue became furred and dry, and the stools more frequent, and he was delirious at night. He did not become comatose, and appeared to die from exhaustion.

Inspection 6 hours after death.—Head not examined. Thoracic organs healthy. The mucous membrane of the ileum at its lower part was much congested and covered with several patches of ulceration, the longest being close to the ileo-cœcal valve. The colon was healthy, except at its junction with the ileum, where the mucous membrane was injected.

Remarks.—This case was entered as common continued Fever at first, and afterwards as Enteritis.

For the last three years, I have examined nearly all the patients admitted into the Jamsetjee Jeejeebhoy Hospital, but I am unable to bring forward any case which, as regards symptoms and morbid appearances, is so characteristic, as to be free from all doubt. Many of these patients were admitted in the last stage of disease, when the symptoms of the affection from which they were suffering had, in a great measure, ceased to be apparent. I thought it was possible that instances of typhoid fever might, on this account, be overlooked, the death being returned as cachexia, diarrhœa, or malarious fever. It, therefore, seemed necessary to ascertain by post-mortem examination whether the appearances usually found in typhoid fever were often present or not. With this object I caused the 'ileum' to be examined in every fatal case that occurred during a part of the year 1861; that is, in every case where the scruples of friends of the deceased did not stand in the way. The number of bodies so examined amounts to one hundred and eleven. Peyer's glands were found to be diseased in 16 cases, as follows:—

	Disease.
1 unusually injected	Myelitis.
1 „ prominent	Cirrhosis.
1 „ „ and red	Phthisis.
5 ulcerated	Phthisis.
2 „	Dysentery.

Six times ulcerated in doubtful cases. Of the latter, three patients were picked up in the road by the Police. Nothing more of their history could be ascertained beyond the fact of their having suffered from looseness of the bowels. In these there were ulcers in the ileum, varying in size and number. In

one, tubercular deposit was found in the lungs. In the others no disease, except that in the ileum, could be discovered. Of the remaining three cases, one was cholera, in which there was a single large ulcer, in the lower part of the ileum; another, looseness of the bowels of 2 months' standing, wherein Peyer's glands were ulcerated, there being also some, though not much, disease of the large intestines; the third case had been long in the hospital with enlarged lymphatic glands. Granular lymph deposit was found in the ileum, the solitary glands were enlarged, and a slough, of the size of a two-anna piece, was observed near the lower end of the ileum.

It must be confessed that there is nothing in the result of these examinations to favour the view, that typhoid fever has occurred to any extent in the hospital, and been overlooked. Two of the cases, just mentioned, may have been examples of that disease, and this, perhaps, is as much as can be said. It should not be forgotten that the patients in the Jamsetjee Jeejeebhoy Hospital are, for the most part, adults, while Typhoid fever chiefly prevails in persons under 20 years of age.

In order still further to bring the experience of the Jamsetjee Jeejeebhoy Hospital to bear upon this point, I have looked through the records of the Clinical Wards, for the last ten years. The number of fatal cases examined, has amounted to two hundred, as follows:—

Fevers	28
Hepatic diseases	34
Dysentery	37
Renal disease	18
Pulmonary „	57
Cerebral „	5
Cardiac „	13
Peritonitis	5
Tetanus	3
Total..	200

The notes of these cases have been kept with much care, and the post-mortem appearances, for the most part fully recorded. Of these 200 cases, the ileum is stated to have been free from disease in 120; in 50 its condition is not mentioned, but it was probably healthy; in the remaining 30 cases it was diseased as follows:—

Peyer's glands were ulcerated in.. ..	14	Cases.
„ „ prominent	5	„
Granular exudation on mucous membrane	7	„
Redness of mucous membrane	4	„
Total..	30	

With a single exception, the ulceration of Peyer's glands occurred when death had clearly been caused by phthisis. The granular exudation was found in dysentery; the prominence of the glands, without ulceration, and the redness of the mucous membrane, in bronchitis, phthisis, and remittent fever. The exceptional case above referred to, is as follows:—

Jockey Deas. Age 30 years; Native Christian, Cook. Admitted into the Clinical Ward, December 10th 1857, died on the 14th.

He had been ill with fever and cough for 5 days before admission. When admitted he was drowsy and could scarcely be got to answer questions; the skin was hot and dry; the pulse 150 and small; the tongue thickly coated white in the centre, and florid at the tip and edges. The bowels were not loose, nor the abdomen distended. He became delirious at night and diarrhœa set in, the evacuations being passed in bed. Pneumonia of the upper lobe of the left lung was detected by physical signs two days after admission. He rapidly lost strength, and died four days after admission.

Inspection.—The intestines were distended, and there was red discoloration of the mucous membrane. Two or three patches of Peyer's gland at the lower part of the ileum were ulcerated. The upper lobe of the left lung was in a state of grey hepatization. The kidneys were enlarged, the cortical part of a yellowish colour and encroaching upon the tubules.

From the foregoing facts it will be apparent that there is nothing in the experience of the Jamsetjee Jeejeebhoy Hospital, and but little in that of the European General Hospital at Bombay,

or of the hospitals of certain European corps, to warrant the inference that typhoid fever is otherwise than a very rare disease. Indeed, so far as the Jamsetjee Jeejeebhoy Hospital is concerned, it might be doubted whether it prevails amongst the class of persons who seek admission into it; for admitting that many cases end in recovery, we should still expect to find the records at least of some fatal cases. Satisfied as I am from what I have seen out of the hospital, that typhoid fever *does* exist in Bombay, I have been surprised, and somewhat, perhaps, disappointed at these negative results; still I have thought it right to bring them before the Society.

ON THE CONVERSION OF CALOMEL INTO CORROSIVE SUBLIMATE BY AMMONIACAL SALTS.

By R. HAINES, M.B., Professor of Materia Medica, Grant College.

Read November 1862.

The instability of the sub-compounds of mercury has long been matter of common observation. One of the most powerful agents in changing their condition is light, by exposure to which the suboxide passes quickly into the state of protoxide, and the subiodide into that of protoiodide. Heat, or the influence of chemical re-agents, not necessarily oxidizing or the reverse, sometimes brings about the same change. It is to be noted however, that the change is not strictly one of oxidation. The chemical effect of light, when exerted at all, appears to be invariably that of deoxidation; thus the oxides of gold and silver are reduced to suboxides or metal, ferricyanide of potassium to ferrocyanide, perchloride of iron to protochloride, and so on. And this in reality is what occurs in the case of mercurial compounds. The primary action is the liberation of metallic mercury, but the halogen or the oxygen thereby set free, and in contact with the sub-compound still unchanged, unites with it and forms the proto-compound. Thus the total effect of such an agent as light is to break up the sub-compound into metallic mercury and a proto-compound. One of the most decided direct proofs of this being the operation of light is, that although light produces protoxide of mercury from the suboxide, the protoxide of mercury itself (the precipitated variety) is partly decomposed by exposure to sunlight, and the blackening of the powder shows that metallic mercury is set free. In view of these facts the evolution of oxygen from the leaves of plants by exposure to light may be inferred to be a simple chemical phenomenon, not connected with the vital energies of the plant further than this, that by the influence of the latter the vegetable juices are made

to circulate, and thus duly to expose themselves to the action of the sun's rays.

But my object in commencing these remarks was not so much to describe the mode in which a change of this kind is effected, as to call attention to the reality of its occurrence in mercurial compounds in less familiar instances. Calomel, the subchloride of mercury, is fortunately far less liable to conversion into metallic mercury and corrosive sublimate than other sub-compounds into their corresponding proto-compounds, the reason apparently being the far greater affinity of chlorine, than of oxygen or of iodine, for mercury. Were it not for this, calomel could not be the safe medicine which it is, and many an accident would cause in it the development of corrosive sublimate, to the imminent danger of the patient and the discredit of the prescriber.

A case has lately come to my knowledge which, although not under my own observation, is detailed by the attending medical officer with great care and minuteness, and which led at the time to a grave suspicion that calomel, internally administered, had become converted in the stomach into corrosive sublimate, for the patient ultimately succumbed under violent inflammation of the mucous surfaces of the alimentary canal. The case was this. An European soldier on a foreign station was attacked with fever of a remittent type, but of no unusual degree of severity. The patient was treated with mild purgatives and with quinine in the intervals of remission, and after a few days he was in the opinion of his attendant progressing favourably. At this juncture the senior Medical Officer of the station visited the patient, expressed his dissatisfaction with the mode of treatment, under-took the management of the case, and prescribed the following medicine :—

℞

Calomel : gr. iii.
Pil : Rhei [Co.] gr. iii.
Ext : Hyoscyami gr. i.—M. ft. Pil : ii .

2ndis horis cum Haustu sequenti exhibendæ.

℞

Liq : Ammon : Acet : ℥ss

Mist : Camphoræ ℥ss

Ammon : Sesquicarb : gr. x.—Misce.

Four doses appear to have been taken. Vomiting and acute pain in the belly followed the exhibition of the second dose, and the symptoms of gastric irritation never left the patient until his death, which happened four or five days after. An examination of the body after death showed signs of acute inflammation of the gastric mucous membrane, and several ulcers in the cardiac extremity of the stomach, besides an extensive gangrenous ulceration at the back of the pharynx.

As these morbid appearances had no seeming connection with the disease for which the patient was first put under treatment, but on the contrary was so remarkably similar to those which are produced by the action of corrosive sublimate, and as the symptoms of the inflammation which caused them came on simultaneously with the administration of medicine containing calomel, it became a matter of interesting inquiry whether the calomel might not have become converted in the stomach into corrosive sublimate. Now, as the calomel was given simultaneously with a draught containing acetate and carbonate of ammonia, it appeared not impossible that the change, if it had really taken place, was effected by the action of the ammoniacal salts.

It was noticed at the time the medicine was prepared for the patient that the solution of acetate of ammonia was highly acid to test paper, but the addition of so large a quantity of carbonate of ammonia in all probability must have reversed this re-action, and rendered the liquid highly alkaline. The formula of the London College for the preparation of the Liquor ammonia acetatis requires that nine drachms, "or as much as may be sufficient" of sesquicarbonate of ammonia be dissolved in their diluted acetic acid, until the latter is saturated. This last direction is in practice little attended to, but the prescribed

quantities are mixed without further trouble. Now the strength of the diluted acetic acid is stated to be such that one fluid ounce is exactly saturated by 57 grains of crystallized carbonate of soda (NaO, CO_2, 10 aq :). A pint will therefore saturate 1140 grains, which is equivalent to 466·7 grains of pure, fresh sesquicarbonate of ammonia ($2NH_4O$, 3 CO_2). But the quantity specified as that probably requisite is 9 drachms, or 540 grains. If then the sesquicarbonate of ammonia be perfectly fresh, by using this quantity there will be in each pint of solution of acetate of ammonia an excess of 73·3 grains of sesquicarbonate, or in each half ounce, the dose on the present occasion, 1·8 grains. But by keeping and exposure the sesquicarbonate is constantly losing ammonia and passing into the state of bicarbonate. If this transformation should be quite complete, the salt will have a composition expressed by the formula NH_4O, HO, 2 CO_2, so that there will be required for each pint of dilute acetic acid 590 grains, instead of 540. There will thus be in each pint a deficiency of 50 grains, or in each half ounce 1·25 grain, equivalent to ·93 grain of sesquicarbonate. Thus, according to the condition of the ammoniacal salt, there may be in each half ounce a maximum excess of 1·8 grain of sesquicarbonate, or a deficiency of ·93 grain, but in practice these extremes will seldom be reached. It is evident then, that unless very great errors indeed had been committed in the compounding, the addition of 10 grains of sesquicarbonate of ammonia to half an ounce of the solution, even if this were originally acid to the full extent of the equivalent of nine-tenths of a grain of the sesquicarbonate, must have substituted for the previous acidity a still more decided alkaline re-action; so that the conclusion can hardly be avoided, that in the case in question the draught given with the calomel contained a large excess of carbonate of ammonia.

The power of ammoniacal salts, and especially of the carbonate, to convert calomel into corrosive sublimate, has been already recognised.* In a case recorded in the *Journal de*

* See Gmelin's Handbuch der Chemie, 4te Aufl. III., 513.

Pharmacie to have occurred in Paris in the year 1840, it seems to have been acknowledged that such a conversion was effected by the agency of a neutral salt, the hydrochlorate,* but no experiments are related which show the possible extent to which the change may proceed. To determine the influence of the acetate, as well as of the carbonate, the following experiments were made:—

Two fluid ounces of the solution of acetate of ammonia were made according to the directions of the London Pharmacopœia, great care being taken to make the solution exactly neutral. It was then divided into three equal parts. To the first were added 20 minims of acetic acid, sp. gr. 1·042, to the second 13 grains of sesquicarbonate of ammonia, and the third was kept neutral. Each portion was poured into a small long-necked phial; 5 grains of calomel (previously ascertained to be pure) added to each, and the phials filled with water nearly to the mouth. They were then corked and placed for an hour and a half in a water bath, the temperature of which ranged during the time from 98° to 102° Fah. A fourth exactly similar phial, containing distilled water and 5 grains of calomel, was placed with the others in the bath. The phials were occasionally shaken, and at the expiration of the time the contents were poured out and thrown upon a filter.

In the acid liquor the calomel had acquired a pale French gray colour; in the alkaline liquid it was of a decided ash gray; in the neutral liquid a pale ash gray, and in the water it was unchanged. On examining the filtrates, the acid liquor gave with nitrate of silver a turbidity but no distinct precipitate, and with sulphuretted hydrogen an olive brown coloration but no immediate precipitate. The alkaline liquor, first acidu-

* See *Edinburgh Medical and Surgical Journal*, LIV., 250. Some powders containing calomel and sal-ammoniac were given to a child, which thereafter died with symptoms of irritant poisoning. The druggist was prosecuted for substituting corrosive sublimate for calomel, but no proof of this was adduced, and the evidence of M. Mialhe was decidedly in favour of the calomel having been changed in the stomach by the agency of the ammoniacal salt.

lated with nitric acid, gave with nitrate of silver a copious precipitate, and with sulphuretted hydrogen an immediate and copious black precipitate. In the neutral liquid the same re-agents produced similar, but less copious precipitates; the water gave no indication of either chlorine or mercury. That the mercury in solution existed in the condition of a protosalt was shown by the action of iodide of potassium, the careful addition of which to the neutral and alkaline solutions caused the formation of a precipitate at first white, and then passing through pink to a brilliant scarlet.

One half of each liquid having been reserved for a quantitative analysis, sulphuretted hydrogen in excess was now passed through the first three liquids. After boiling, the precipitates were collected, washed by decantation, and dried on a watch glass. The precipitate of sulphide of mercury yielded by the acid liquid was too small to be weighed; that from the alkaline liquid weighed ·61 grain, and that from the neutral liquid ·15 grain, equivalent to ·713 and ·163 grain of corrosive sublimate respectively. It is therefore clear, that under conditions as nearly as possible similar to those in which medicine would be placed in the stomach, $2\frac{1}{2}$ grains of calomel with solution of acetate of ammonia containing $6\frac{1}{2}$ grains of sesquicarbonate of ammonia in excess, may in one hour and a half produce ·713 grain of corrosive sublimate, equivalent to $27\frac{1}{2}$ per cent. of the calomel employed, or if perfectly neutral ·163 grain. Probably a prolonged action would proportionately increase the amount of corrosive sublimate, so that four doses of the kind prescribed in the case above mentioned might possibly yield some 6 or 8 grains of corrosive sublimate.

Two other and similar sets of experiments were made, but as the temperature was not maintained so regularly within the limits of the animal heat, no quantitative analysis was made. The action of the tests, however, was much the same, but there were indications that the elevation of the temperature by a few degrees caused a sensible increase in the chemical action.

In the state of a neutral salt, the action of the acetate thus far appears greatly to exceed that of most other salts of ammonia in converting calomel into corrosive sublimate, and in an alkaline condition its action is evidently so energetic, as to make it exceedingly dangerous to administer these two preparations at the same time.*

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* After the reading of Dr. Haines' paper a Committee was formed, for the purpose of carrying out some experiments in elucidation of this subject: the report of the Committee is contained in the *Appendix*, Article No. 2.

ON THE OPERATION FOR ELEPHANTIASIS SCROTI; WITH CASES AND REMARKS.

By Assistant Surgeon G. R. BALLINGALL, M.D., Professor of Surgery, Grant Medical College, Bombay.

Read October 1862.

The object of the present brief communication is to put on record my further experience of the operation for Elephantiasis of the Scrotum. Since the date of the last paper, published in the Society's Transactions (No. 4, New Series), I have removed ten tumours successfully, two of these being of considerable size. These, with eleven previously recorded, amount to twenty-one, to which must be added two formerly alluded to as operated on by Mr. Burjorjee Dorabjee, and one since removed by Mr. Cowasjee Hormusjee. There is thus a total of twenty-four cases with two deaths, a small mortality when we consider the serious nature of the operation where the tumour is large.

I have nothing to add regarding the pathology of the disease, as further observation has only confirmed the opinion formerly expressed, as to its local nature; and with reference to treatment, the only point requiring notice is the benefit derived from change of air to the interior of the country. The disease, so far as I have seen, is confined to the sea coast, and several private patients have derived benefit from a residence in Poona, though unfortunately the amendment is only temporary, the disease beginning again to progress on a return to Bombay. The affection is commonly attributed by natives to eating fish; this cannot, however, be the cause, as a large proportion of the patients have been Bunias, who never use this article of food.

Of the ten cases only two require particular notice; of these I shall give a short account: one is interesting from the great

size of the tumour which, after removal, weighed 106½ pounds; the other from its complication with hernia.

Case 1.—N. I., a cachectic-looking Parsee, aged 45, was admitted into Hospital on 18th August 1861, with hypertrophied scrotum. The tumour was of considerable size, being about two feet long and the same in breadth. The disease was said to have commenced about fifteen years before, and during its progress the patient had suffered from repeated attacks of erysipelatous inflammation, with fever. These have latterly recurred every two or three months, and when admitted, he was suffering from one of them.

Owing to his debilitated condition I was at first unwilling to interfere, but at his urgent request the operation was performed under chloroform on 12th September. After exposing the penis the neck of the tumour was transfixed from above downwards in the middle line, the knife emerging in the perineum; a strong double ligature of cord was then passed through this incision, and the ends being brought up round each side, were fixed to an "ecraseur" by which the ligatures were tightened as much as possible. The whole mass beyond including the testicle was then rapidly removed by double flap incision. The bleeding was moderate, and after the principal vessels had been secured, the ecraseur was removed. While examining the wound, the right flap was raised, when a gush of somewhat turbid serous fluid took place, and on further investigation, it was found that the end of a hernial sac had been cut off, the finger passing freely into the abdomen. On the left side there was also a hernia, the sac having just escaped, and the fluid contents receiving a distinct impulse on coughing. There was considerable shock, requiring the free use of stimulants. The edges were brought together by metallic sutures. The tumour after removal was found to weigh upwards of forty pounds.

The recovery, though somewhat slow, was steady; no peritonitis followed, and the only circumstance requiring notice was the necessity of emptying the bladder by catheter, soon after the operation. Retention of urine has, I may mention, occurred in several cases. The patient was discharged well on 29th November, there being a distinct hernial protrusion on each side.

Case 2.—P. I., a Khoja, aged 37, who had been resident for about twenty years at Zanzibar, was admitted on 20th July 1862. The tumour was of enormous size, measuring round from groin to groin 6 feet, and in transverse circumference 5 feet. The disease was of seventeen years' standing, and during its progress he had suffered from irregular febrile attacks with inflammation, these being most frequent in the wet season. Suppuration had followed tapping with a trochar, but the wound healed before admission. The patient did not seem very cachectic, though his pulse was extremely small.

The operation was performed on 26th July, exactly as detailed in the first case, except that the ligatures round the neck were tightened by two tourniquets. Much difficulty was experienced in the manipulation owing to the enormous size of the tumour, which after removal weighed 106½ pounds.

The after shock was very great, re-action not being properly established for some days, chiefly in consequence of considerable hæmorrhage on the following day. The patient suffered also from irritability of stomach, and disinclination to take food. The subsequent recovery was, however, uninterrupted, and he was discharged well on 4th September.

Remarks.—The extreme debility of the first patient suggested the propriety of taking some steps to prevent bleeding, and the best method seemed to be the double ligature round the neck of the tumour. This can be passed without much loss of blood, as, by keeping in the middle line, the principal arteries (the external pudic and the superficial perineal) are avoided. The principle I believe to be good, but the instruments used were not very efficient, the ecraseur, owing to the fineness of the screw, tightening the cords too slowly, while the tourniquets were in the way. The best apparatus would, I believe, be a modification of the "ecraseur" with a larger screw like that of the tourniquet.

The presence of hernia was a serious complication in the first case, though fortunately no bad consequences followed the opening of the sac. The patient was most carefully examined before the operation by myself, and also by Dr. Peet, when he was on the table; but though hernia was suspected, its existence could not be positively ascertained owing to the sacs being empty. More information is desirable respecting the cases in which this complication has existed, as, though Mr. Webb of Calcutta alludes to the necessity of careful examination, I can find no mention of any instance where hernia was present. I propose shortly to operate on a patient who has reducible hernia on the right side, and shall endeavour to preserve the sac by beginning at the lower part of the testicle and dissecting carefully upwards. Should this operation be performed, I shall lay the result before the Society.

Note by the Secretary.—I avail myself of Dr. Ballingall's permission to state, in a note, the results of the microscopic examination which I made, of the large tumour removed from CASE No. 2. The surface of the tumour was tuberculated, but none of the tubercles appeared to contain lymph, having already become consolidated. The *cuticle* was little, if at all, hypertrophied, but the papillary layer of the *corium* was enormously developed; the *papillæ* being $\frac{1}{30}$ to $\frac{1}{60}$ in. in length, and of very varying shape, sometimes bifid, and once at least forming a complete loop. Similar large papillæ are found in other parts, as the leg and foot, affected with elephantiasis. All contained capillaries, sometimes filled with dark pigment. The deeper layer of the corium ($\frac{1}{8}$ to $\frac{1}{12}$ in. thick) had a reddish-grey tint, and was marked with vertical lines or streaks, which were owing to blood-vessels passing in an upward direction; the calibre of the latter was changed, and their walls much thickened, but in no other part did the involuntary muscular fibre seem abundant. Below this, the structure of the tumour seemed to be composed of the fibrous tissues only, diminishing in consistence, as usual, towards the centre.

Having on various occasions since the publication of my remarks on Varicose Lymphatics (Trans. Med. and Phys. Soc. of Bombay, Vol. VII. New Series) had the opportunity of examining patients affected with Elephantiasis, and also several of the tumours removed, I may add that the opinion then expressed, of the close connection (to say the least) of a varicose condition of the lymphatics and this kind of tumour, has been fully confirmed. As to the general structure of these tumours, the following is from my note-book:—When compared with the healthy scrotum, it would appear that all the tissues of this part are hypertrophied; the *dartoid* is greatly increased (at least in moderate-sized tumours, but it did not appear to be so in the very large one described above), the bundles of which it is formed being two or three times larger than those of the white fibrous tissue, which they about equal in the normal state; the *fibre-cells* are probably increased in number as well as size (just as in the uterus during pregnancy), some measured $\frac{1}{400}$ by $\frac{1}{6}$ — $\frac{1}{4000}$ in., and others were seen in course of development, being fusiform in shape and provided with oval or rounded nuclei; the contractile element is most abundant in the sub-cutaneous tissue, being absent in deeper parts, but again to be detected near the Tunica Vaginalis, corresponding to the layer described by Kölliker; the *fibrous tissues* are greatly increased in amount, the white variety does not differ from the same in health, the yellow or elastic has larger and more numerous fibres; the *cuticle* is little altered; the *vessels* are of course increased, but the *nerves*, *ducts*, &c. are apparently not so. In actual manipulation I have not found the carmine solution so uniform in action as has been stated, but it is useful in the detection of pale muscular fibre.—H. V. C.

A COMMENTARY UPON A TABULAR STATEMENT OF THE NUMBER OF PAROXYSMS OF MALARIOUS INTERMITTENT FEVER THAT OCCURRED IN 146 MEDICAL CHARGES IN THE BOMBAY PRESIDENCY IN THE YEAR 1861, ARRANGED AS DATA FOR DETERMINING THE QUESTION OF THE MOON'S INFLUENCE UPON THESE FEVERS.

By HERBERT GIRAUD, M.D., Edin.; Surgeon, Bombay Army, Professor of Chemistry and Botany in Grant Medical College.

That the Paroxysms of Ague or Malarious Intermittent Fever of Tropical Countries occur more frequently at the New and Full Moon than at other times is an opinion so generally entertained, both by professional and unprofessional people, that it is remarkable, that so small a number of actual observations, bearing upon the question, should hitherto have been recorded; and it is still more remarkable that these scanty records themselves either fail to prove the so-called Lunar Influence upon Fevers, or, in some instances, actually contribute to disprove it.

It is now nearly a century since Dr. Lind (1768) first directed attention to this subject, and from that period up to the present, almost all writers on Tropical Fevers have adverted to it: but those who have expressed their belief in Lunar Influence (and these are the majority) have founded that belief either upon general impressions, or upon the results of observations far too limited to justify the conclusions drawn from them.

In the year 1843, Dr. Peet, the present Principal of and Professor of Medicine in Grant College, Bombay, collated all that had then been written upon the subject in an Article in the 6th No. of the Transactions of the Medical and Physical Society of Bombay, entitled "An inquiry into the evidence which is recorded in relation to the Influence of the Lunar

changes upon certain forms of Disease." In that article Dr. Peet specially considers the evidence regarding the influence of the Lunar changes on Malarious Intermittent Fevers, and he conclusively shows that the opinion so commonly entertained, that Paroxysms of Intermittent Fever occur more frequently at the New and Full Moon than at other periods of the Moon's age, is certainly not supported by *recorded evidence*, and, in conclusion, he remarks " when we consider the very general idea which prevails upon this subject, it will appear almost surprising that so few facts are recorded in its favour ; as it might be thought there would be no great difficulty (by keeping records of the number of attacks of Fever in a Corps) in collecting such information as would be sufficient to prove at once, whether there is really that coincidence between the occurrence of this disease and the changes of the Moon, which the advocates of the doctrine would lead us to believe."

Since the publication of Dr. Peet's Paper the only recorded observations bearing upon the question are (so far as I am aware) those of Assistant Surgeon Day, of the Madras Medical Service, published in an article in the 10th No. of the Indian Annals of Medical Science, July 1858, entitled, " On Relapses in Tropical Fevers." In this article Mr. Day records the results of observations on the relations supposed to exist between the recurrences of Intermittent Fevers, and the seasons of the year and the Phases of the Moon: results deduced from 613 cases observed in the Deccan and Mysore. With regard to Lunar Influence, Mr. Day's conclusions are very undecided. It appears, however, that no coincidence could be traced by him between the admissions of Fever and New Moon; but that a considerable increase of admissions took place about the Full Moon.

Mr. Day admits that his cases were too few to justify any strong statement being founded upon them. Mr. Day also endeavoured to ascertain whether the severity of the attacks was in any way traceable to Lunar Influence. He decides this in the affirmative; and states that it was most remarked when

the Fever set in during the time of Full Moon. As regards relapses of Fever, Mr. Day gives a Table of 52 re-admissions, 20 of which took place at the New and Full Moon, and 32 at intermediate periods.

No one can read Mr. Day's paper without being struck with the insufficiency of the data upon which to found an inquiry into the truth or otherwise of Lunar Influence upon Disease.

The want of reliable evidence in support of the Influence of the Moon upon Periodic Fevers having been casually brought to the notice of the Commander in Chief—Sir Wm. Mansfield, His Excellency directed that records of Paroxysms of Periodic Fevers should be kept in every Medical Charge in the Presidency, with a view to determine the question by statistical evidence. The following Circular was accordingly issued to Divisional Deputy Inspectors-General of Hospitals, with the accompanying Form, No. 2000 of 1860, Bombay, 10th December 1860.

"The Principal Inspector-General Medical Department, having been directed by His Excellency the Commander in Chief to furnish data, extending over two years, to determine, if possible, the question whether Paroxysms of Remittent and Intermittent Fevers occur more frequently at the Lunar Phases* than at other periods, desires Deputy Inspectors-General of Hospitals will be so good as to request all Medical Officers in charge of Hospitals (European or Native, Civil Jail or Police) and Dispensaries to keep accurate registers of the Paroxysms of Fever occurring amongst their patients in the following form, one copy of which is to be forwarded monthly, along with other returns to Deputy Inspectors-General of Hospitals, for transmission to this office, and the other copy filed in the Hospital for inspection and reference."

These forms were issued in time for observations to be commenced on the 1st of January 1861, and these were continued

* New and Full Moon are here meant.

throughout the whole of the year. At the end of each month the forms, duly filled in, were transmitted by Deputy Inspectors-General of Hospitals to the Office of the Principal Inspector-General, and by his permission they were forwarded to me for arrangement and tabulation. The accompanying Table presents the results thus arrived at.

In the monthly Forms the dates of the New and Full Moon were purposely omitted, in order that Medical Officers might not be biassed in their observations by the Phases of the Moon being prominently noted.

In tabulating the results of observations from the monthly Forms I first noted the dates of New and Full Moon. I considered the so-called "Springs" (the periods of supposed "Lunar Influence") to extend from two days before to two days after the days of the New and Full Moon inclusive:—making *five* days at each Lunar Period, or *ten* days in the month, so that the two Lunar Periods together occupy *one-third* of the entire month:—leaving out of consideration the extra day in the months that have 31 days. Thus we have *ten days* in the month, during which the Lunar Influence (if any) may be supposed to exist, against *twenty days*, when it may be supposed to be absent:—and therefore if there be any truth in the opinion that Periodic Fevers commence and recur more frequently at the New and Full Moon than at the other periods of the month, it is obvious that more than *one-third* of the total monthly Paroxysms should occur in the ten days of the "Springs": and further, if this opinion had so broad a foundation in facts as its general prevalence would lead us to expect, then the Paroxysms recorded in the ten days of the Springs should *very notably exceed* one-third of the total monthly Paroxysms.

Now, on examining this table, it will be seen that in each month the number of Paroxysms occurring at the "Springs" is singularly near one-third of the total monthly Paroxysms: and when all the monthly totals for the year are added together, it is seen that, out of 56,175 Paroxysms, there were 18,077 at the

Springs, and 38,098 not at the Springs; thus showing not merely no preponderance in favour of the "Springs," but actually leaving a balance of 648 Paroxysms against the doctrine of the Influence of the New and Full Moon in Periodic Fevers.*

An attempt was made in the Monthly Forms to induce observers to distinguish between First or Primary and Recurring or Secondary attacks of Periodic Fever; because, those who hold to the doctrine of Lunar Influence are generally of opinion that it is in Recurring or Secondary attacks that this influence is most marked, and it was therefore thought desirable that this point should, if possible, be decided. I found however, in tabulating the observations, that it was quite evident that, either from the explanatory note in the Monthly Form not being sufficiently clear and explicit, or from some other cause, a great many observers failed to distinguish the Primary from the Secondary attacks. Thus certain observers entered all their cases as Primary, whilst other recorded all theirs as Secondary, although it cannot be believed that, in a particular Regiment or Station, the cases of Periodic Fevers were, for a whole year, either all Primary or all Secondary. This error of observation consequently would prevent any conclusive result being arrived at regarding the relative bearing of Lunar Influence upon Primary and Secondary Paroxysms of Fever (supposing such influence to exist), but it in no way affects the value of these observations as data for the determination of the general question of Lunar Influence;—because, if from the whole observations taken collectively, the fact of Lunar Influence cannot be proved, then of course the supposed influence in Secondary cases must fail of proof also.

It must be remarked also that, in so very large a number of cases as that which came under observation, it is probable that Diagnosis was occasionally at fault, and that some of the supposed cases of Periodic Malarious Fever were in reality those

* 56,175÷3=18,725—18,077=648.

of Inflammatory and Hectic Fevers. But as such cases must have contributed in very small proportion to the 56,175 recorded Paroxysms; and as it has never been supposed that such fevers are in any way influenced by the Phases of the Moon, their being included in the Table of Results cannot affect the question at issue either one way or the other. Nor can the question be affected by occasional errors of omission and commission in the filling in of the Monthly Forms; because such errors would not be more liable to occur at one period of the month than at another; and therefore in so large a mass of observations, they would neutralize one another and would not affect the general result. It has been asserted by some that it is only in certain localities (as for example in Sind and Goozerat) that Lunar Influence is manifested. On referring to the Table it will be seen that the returns from these Provinces give no support to this opinion; but, on the contrary, that the Paroxysms occurring within the *ten days* of the Springs are as near as possible one-third of the told monthly Paroxysms: in some months a little more, in others a little less than one-third.

The Table is a record of 56,175 Paroxysms of Fever, that occurred in 146 different Medical Charges, at 44 different Stations, throughout the Bombay Presidency. It presents therefore the results of far more extended observations than have ever been brought to bear upon this question. If, therefore, it should be admitted to be sufficiently trustworthy for the purposes of induction, it must lead to the inevitable conclusion, that Paroxysms of Malarious Periodic Fevers do not occur more frequently at the 'Springs' than at other periods of the month. Such disproof of the Moon's Influence is the conclusion that has been invariably arrived at, whenever observations, statistically recorded, have taken the place of superstitious belief and of general and vague impressions. It has been thus with the reputed Influence of the Moon on Plague, Asthma, Hysteria, Insanity, Periodical Hæmorrhages and Cholera. A most noteworthy instance in illustration of this occurred but a few years ago with regard to Epidemic Cholera, the attacks

of which were very generally believed (particularly in the Madras Presidency) to be more numerous at the New and Full Moon than at the other Lunar Periods. When, however, by order of the Madras Medical Board, cases were selected from different official records, it appeared that, out of 7,664 cases observed, 3725 were admitted during the quarters of the New and Full Moon, and 3939 during the first and last quarters: leaving therefore a difference of 214 cases against the prevalent opinion. But the pertinacity with which a belief in the Moon's Influence is generally maintained in spite of the opposing results of observation is not confined to its supposed relation to Disease. It is equally remarkable with regard to the general belief in the Influence of the Moon upon the Weather. For although some years ago Arago, from extended observations recorded in various parts of the world, came to the conclusion that there exists no relation between the Phases of the Moon and the states of the Weather, and although our own Astronomer Royal, Airey, has more recently arrived at the same conclusion from different observations, yet to this day even well-informed people confidently predicate the changes of the Weather from the known dates of the changes of the Moon. In Bombay, people will confidently tell you that on such a date the "Monsoon will burst," because that is the day or near the day of the New Moon. They seem to forget that, as a general rule, the Monsoon bursts at dates differing within a fortnight or three weeks of each other at different parts of the Coast, and that, although it may occur at some one place at the New Moon, that place cannot always happen to be Bombay: for they surely would disclaim the idea that Bombay is peculiarly under Lunar Influence. At this very time (October 1st) there is a general and very firm belief in Bombay, even amongst enlightened Europeans, that a Cyclone is to sweep over the Island on the 23rd instant, because the Moon happens to be New and in Perigee on that date. Now in the first place, it has never been proved by the observations of Reid, Piddington, Thom, or of any of the writers on the "Law of Storms," that they occur

more frequently when the Moon is New and in Perigee than at other times; and secondly, a Cyclone frequently occupies several weeks in traversing the Indian Ocean, and during this time the Moon has passed through several of her phases. Moreover, supposing a Cyclone should happen to occur at a certain place at the New Moon, it does not appear why that place should be Bombay in preference to other parts of the Indian and China Seas.*

This prevalent notice of the connexion of Diseases and of atmospheric disturbances with the New and Full Moon would appear to result from two causes: first, the known relations of the Tides to the phases of the Moon, and secondly, the fact that New and Full Moon are well marked and notable periods. I have had it said to me;—"how can you deny Influence of the Moon upon Fever, when you know that it regulates the Tides"? a question betraying such utter ignorance of the first principles of logical induction as to prevent one's wonder that it should have been put. Again, the New and Full Moon are well marked periods; so that recurrences of Fever happening at the Springs are specially noted, whilst the frequent occasions on which they take place at other periods of the Moon pass by unheeded. Some years ago, when the old slow Steamers were very irregular in the dates of their arrival, it was a prevalent belief in Bombay that the English Mail came in more frequently on a Sunday than upon any other day in the week. Sunday is more marked and notable than any other day in the week; and therefore, when it did so happen that the Steamer arrived upon a Sunday, it made a greater impression, and was associated more permanently in memory with that day, than it would have been had it arrived upon either of the other six days of the week.

This peculiar fallacy in induction was well known to and was pointed out by Lord Bacon (Novum Organon, Aphorism XLVI.) He says:—"Men mark the events where they are

* The predicted Cyclone did not occur.

fulfilled; but where they fail, though this happens much oftener, neglect and pass them by. The first conclusion colours and brings into conformity with itself all that came after. It is the peculiar and perpetual error of the human intellect to be more moved and excited by affirmatives than by negatives: whereas it ought to hold itself indifferently disposed towards both alike. Indeed, in the establishment of any axiom, the negative instance is the more forcible of the two."

Tabular Statement of number of Paroxysms of Malarious Intermittent Fever, which occurred in 146 Medical charges in t

A Paroxysms at the Springs. **B** Paroxysms not at the Springs.

a Primary attacks. **b** Secondary attacks.

	STATIONS.	HOSPITALS.	JANUARY.				FEBRUARY.				MARCH.				APRIL.				MAY.			
			A		B		A		B		A		B		A		B		A		B	
			a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
Presidency Division.	Colaba	56th Foot	..	..	2	4	3	..	6	..	..	7	2	14	..	19	1	31	..	3	8	..
	Bombay	2nd Battn. and 4 Co. 1st Bn. Art.	2	..	4	2	..	..	..	1	..	..	3	4	7	..	7	..	2	..	..	..
	Do.	European General Hospital	..	3	..	20	2	5	4	10	..	6	3	13	..	3	..	6	..	6	..	..
	Do.	2nd Grenadier Regiment N. I.	4	25	5	41	7	16	4	44	2	24	6	33	3	19	13	39	7	42	14	..
	Do.	23rd Regiment N. I.	4	26	4	37	7	23	4	36	7	35	6	60	1	21	4	41	..	19	6	..
	Do.	Marine Battalion	..	21	..	57	2	1	2	3	..	1	1	9	..	3	..	11	..	3	1	..
	Do.	Jamsetjee Jejeebhoy Hospital	29	9	65	13	32	22	72	46	21	..	27	3	9	15	20	20	14	21	29	..
	Do.	House of Correction	6	..	19	..	1	..	8	..	..	2	2	5	7	..	4	5	6	..	9	..
	Do.	County Jail Hospital	3	..	10	..	2	..	..	..	5	..	10	..	..	..	..	..	..	..	1	..
	Do.	Central School Hospital	3	5	2	..	1	..	..	..	..	..	..	..	1	..	3	..	..	..	..	..
	Do.	Police Hospital	2	1	6	..	..	..	1	..	2	..	3	..	3	..	7	..	6	..	2	..
	Tanna	Detachment 2nd Gren. Regt N. I.	4	8	5	6	5	14	12	36	..	..	..	..	..	..	..	..	..	..	..	..
	Do.	Civil Hospital	2	..	5	3	1	1	1	1	1	1	..	..	..	7	2	6	..	7	3	..
	Do.	Jail Hospital	2	3	9	6	2	2	5	6	3	2	7	13	4	6	2	9	5	9	7	..
	Do.	Police Hospital	18	24	28	47	11	20	30	32	5	8	15	9	3	3	6	5	9	4	9	..
	Poona	Bombay Horse Brigade	1	..	..	..	..	..	..	..	..	..	2	..	2	..	1	..	1	..	4	..
	Do.	1 Batt. 13th Brig. & Details R. A.	..	15	3	24	..	7	..	9	5	7	1	42	2	..	12	12	5	..	6	..
	Do.	2 Batt. 13th Brig. Royal Art.	..	2	..	17	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Do.	1st Bombay European Regiment.	29	..	45	..	25	..	36	..	31	..	40	..	5	4	38	1	12	3	10	..
	Do.	Details ditto	1	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Do.	Detachment 56th ditto	43	4	99	1	2	..	34	..	..	..	..	..	1	..	1	..	..	..	..	..
	Do.	57th Regiment Depôt	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Do.	25th Regiment N. I.	1	..	4	4	1	..	..	8	1	2	..	..	..	1	2	6	..	5	4	..
	Do.	Details Sappers and Miners	4	23	16	45	10	28	11	44	8	27	13	67	5	14	11	36	7	15	17	..
	Do.	Civil Insane and Police Hospital	10	..	23	..	12	1	38	1	17	..	17	3	19	2	14	..	11	2	28	..
	Do.	Jail Hospital	..	..	..	..	6	2	21	17	..	..	16	..	15	1	23	..	7	..	3	..
	Kirkee	1st Battalion Artillery	7	8	12	6	3	..	2	2	2	3	7	5	12	1	9	1	2	..	12	..
Poona Division.	Ahmednuggur	2nd Company 3rd Batt. Art	3	..	3	..	2	..	..	..	3	9	1	10	..	3	2	17	2	..	..	..
	Do.	6th Dragoons	5	..	5	1	3	..	6	..	3	..	8	..	5	..	6	..	14	..	37	..
	Do.	22nd Regiment N. I.	28	2	58	..	19	10	71	13	21	6	47	7	23	..	38	..	16	..	60	..
	Do.	Civil Hospital	1	3	1	2	2	5	2	5	1	4	6	17	1	3	4	13	..	..	2	..
	Do.	Jail Hospital	2	22	16	40	3	14	14	45	11	20	18	57	3	15	9	27	7	27	13	..
	Do.	Police Hospital	..	..	..	..	..	..	..	..	..	..	..	..	1	2	..	1	1	..	1	..
	Sattara	Detachment 56th Regiment	..	5	5	..	6	2	15	4	23	7	12	16	16	16	26	10	4	14	3	..
	Do.	Civil Hospital	11	..	27	..	5	..	12	..	3	..	6	..	5	..	13	..	7	..	15	..
	Do.	Jail Hospital	12	..	22	..	20	..	13	..	13	..	35	..	25	..	36	..	12	..	7	..
	Do.	Police Hospital	7	..	22	..	5	..	20	..	35	..	59	..	3	..	22	..	5	..	26	..
	Sholapoor	3rd Company 2nd Batt. Art	2	3	3	7	4	7	10	12	2	5	9	13	..	2	5	4	5	7	6	..
	Do.	28th Regiment N. I.	4	3	4	6	4	..	13	5	4	..	7	3	15	..	29	2	11	..	13	..
	Do.	Civil Jail and Police Hospital	12	1	38	11	18	6	28	12	14	6	50	24	21	9	44	12	21	7	34	..
	Aurungabad	4th Company 4th Batt. Art.	..	..	..	..	5	..	4	..	1	..	7	..	1	..	4	..	..	..	..	..
	Do.	3rd light Cavalry	1	4	11	..	..	..	5	..	2	..	9	..	4	..	10	..	4	..	10	..
	Do.	8th Regiment N. I.	6	20	10	29	1	4	2	3	..	7	2	4	5	13	15	27	9	21	15	..
	Do.	26th Regiment N. I.	2	16	1	45	..	14	..	25	5	18	5	36	1	19	4	36	..	22	..	..
	Malligaum	6th Company 4th Batt. Art.	..	..	..	..	3	..	1	..	..	..	3	..	2	..	..	..	3	..	1	..
	Do.	6th Regiment N. I.	3	..	17	..	10	..	12	2	2	..	4	1	11	1	18	..	6	..	10	..
	Seroor	1st Poona Horse	..	..	..	3	..	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..
	Do.	2nd Poona Horse	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Dhoolia	Detachment 6th Regiment N. I.	4	..	15	..	..	..	..	1	..	1	..	1	..	..	..	..	..	..	..	..
	Do.	Detachment Poona Horse	1	1	6	4	..	..	4	..	3	..	2	..	..	..	6	..	..	..	..	..
	Do.	Civil Hospital	2	..	1	..	3	..	8	..	..	..	1	..	..	..	..	..	2	..	1	..
	Do.	Jail Hospital	..	..	..	..	3	..	7	..	1	..	3	..	4	..	3	..	..	3	5	..
	Dharumghaum	Candeish Bheel Corps	10	1	21	3	8	9	16	9	3	5	8	10	3	2	3	5	4	..	10	..
	Nassick	Civil Hospital	9	..	14	..	2	..	1	..	..	..	4	..	2	..	6	..	..	..	..	..
	Do.	Detachment Police Hospital	3	..	2	..	5	..	20	..	14	..	27	..	3	..	6	..	9	..	10	..
	Poorundhur	Sanitarium	..	32	..	65	5	20	2	33	..	34	2	50	..	25	4	74	..	35	..	..
Northern Division.	Ahmedabad	4th (King's Own) Regiment	12	18	14	65	1	6	2	16	..	8	3	8	..	12	2	16	..	14	8	..
	Do.	11th Regiment N. I.	54	10	89	6	24	11	46	20	13	..	36	..	34	8	98	11	5	..	42	..
	Do.	14th Regiment N. I.	25	2	53	..	11	4	12	2	19	..	29	..	22	7	41	17	12	..	37	..
	Do.	Guzerat Irregular Horse	8	1	19	5	..	..	3	2	3	..	2	..	5	..	14	..	..	..	3	..
	Do.	Civil Hospital	1	..	4	..	2	..	5	..	..	..	1	..	..	..	1	..	..	..	3	..
	Do.	Jail Hospital	5	..	17	..	7	..	21	..	9	..	23	..	17	..	16	..	5	..	10	..
	Do.	Police Hospital	21	1	39	9	16	..	20	..	15	..	21	..	10	..	31	..	3	..	21	..
	Dooliakote	3rd Company 3rd Batt. Art	4	3	1	5	..	2	..	2	..	..	1	2	2	..	..	1	..	..	..	..
	Do.	4th Battalion Artillery	6	3	10	15	8	8	30	1	..	..	..	..	17	..	36	..	20	..	17	..
	Deesa	33rd Foot	..	12	..	23	..	6	..	10	..	7	..	26	..	1	..	14	..	20	2	..
	Do.	31st Regiment N. I.	87	..	182	..	3	22	8	40	3	5	1	16	3	7	3	7	2	3	3	..
	Aboo	Sanitarium	..	8	..	25	..	5	..	8	..	2	..	5	..	14	..	14	..	11	..	..
	Rajcote	Squadron 2nd Regt. Light Cav.	..	..	..	..	..	..	..	..	..	..	2	..	..	..	1	1	..	..	1	..
	Do.	Civil Hospital	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Do.	Jail Hospital	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Surat	Detachment 56th Regiment	6	15	15	15	9	28	5	43	..	..	..	..	6	14	2	30	..	4	..	..
	Do.	16th Regiment N. I.	106	7	204	9	..	..	..	..	..	..	..	..	1	4	4	15	..	16	11	..
	Do.	Jail Hospital	5	33	7	69	..	15	..	63	5	..	25	..	..	28	..	32	..	18	..	..
	Baroda	30th Regiment N. I.	23	35	16	95	16	12	35	21	..	..	..	..	9	35	32	69	28	9	45	..
	Broach	Detachment 16th Regiment N. I.	11	..	21	..	15	2	20	1	9	5	19	9	8	..	18	1	..	..	2	..
	Do.	Civil Hospital	..	..	3	..	2	..	1	..	1	..	8	..	..	..	..	..	4	..	4	..

Presidency in 1861, *arranged as data to determine the question of the Moon's influence upon those Fevers.*

ings" are here considered to be five days at the New, and five days at the Full Moon—in all ten days, or one-third of the Month.
These *five days* are two days before, two days after, and *the day* of, the New and Full Moon respectively.

NE.		JULY.				AUGUST.				SEPTEMBER.				OCTOBER.				NOVEMBER.				DECEMBER.			
B		A		B		A		B		A		B		A		B		A		B		A		B	
a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
6	63	13	120	35	262	12	63	14	96	1	13	1	21	1	24	2	85	..	..	..	..	..	6	..	11
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	3	..	3	..	7	..	12	..	3	..	13	..	1	..	8	..	4	..	5	..	9	..	14
39	66	..	..	..	..	18	29	22	35	7	30	20	72	13	35	27	85	4	21	1	47	1	25	2	46
7	50	2	28	17	48	2	21	4	47	3	20	5	19	4	12	2	14	2	4	4	3	4	..	3	..
..	20	..	8	1	11	..	..	..	..	..	2	..	7	..	7	..	13	..	..	..	..	..	..	..	..
46	23	22	24	56	43	31	20	39	42	26	15	47	41	34	35	47	61	32	72	68	102	29	41	94	79
7	5	3	4	8	2	3	..	7	2	2	2	1	1	2	2	4	3	2	..	6	1	8	..	12	2
14	..	..	..	1	..	1	..	13	..	10	..	8	..	..	..	3	..	1	..	18	..	5	..	7	..
4	..	1	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	..	..	..	..	..	..
4	..	12	..	6	..	2	..	4	..	1	..	2	..	3	..	2	..	1	..	6	..	..	..	4	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	4	2	3	..	5	2	9	1	5	2	3	..	..	..	..	2	4	..	7	5	23	..	..	4	6
5	17	3	2	5	13	2	5	7	8	3	4	1	4	3	2	10	12	2	..	5	13	1	1	8	7
14	4	3	..	5	1	3	3	10	13	6	7	12	11	14	8	17	33	18	33	40	83	6	5	35	42
7	..	..	..	5	2	..	..	2	2	2	1	6	1	..	..	8	1	3	..	11	5	..	..	..	..
..	7	..	2	..	8	..	..	..	..	10	5	13	12	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	2	6	6	6	..	..	..	..	..	5	..	9	..	5	..	4	..	1	..	2
2	2	3	..	8	..	..	..	11	1	..	1	1	1	..	2	4	3	2	4	14	1	12	..	6	3
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	3	..	..	8	..	5	..	..	..	13	2	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	2	1	5	2	9	1	9	5	9	..	10	5	21	4	11	7	52	6	11	4	13	3	7	7	28
18	47	6	25	10	47	8	24	14	66	13	37	10	59	10	42	16	94	8	55	22	99	3	33	14	86
30	12	13	9	17	22	9	5	18	15	2	1	4	7	9	10	15	20	14	14	30	19	7	2	18	9
10	1	9	1	22	..	13	..	25	..	..	..	4	..	4	..	6	..	14	..	24	..	12	..	29	..
6	..	..	..	6	..	1	..	25	..	2	..	6	1	7	..	28	..	8	..	20	2	3	3	7	..
3	..	2	..	..	..	1	1	1	..	2	..	2	..	1	..	1	..	..	..	..	..	..	..	..	..
24	3	4	1	13	3	6	3	4	4	1	3	2	9	..	..	2	7	..	3	1	4	..	..	..	5
26	..	20	2	41	..	21	4	43	15	20	..	16	..	24	..	50	..	20	8	20	6	5	2	13	3
1	4	2	2	2	8	1	..	..	7	..	2	..	1	..	..	2	7	4	9	4	7	1	4	2	5
9	27	3	7	5	20	1	7	7	14	4	10	7	11	3	4	7	13	1	9	5	11	1	2	..	1
..	1	2	4	1	2	1	1	1	2	..	..	1	2	2	1	..	3	3	2	4	10	1	1	4	11
31	12	14	13	31	23	11	14	18	23	6	6	3	9	3	5	18	4	5	9	7	22	..	..	..	..
27	..	36	..	69	..	36	..	67	..	24	..	35	..	10	..	32	..	21	..	28	..	23	..	61	..
5	..	8	..	4	..	..	..	..	..	1	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..
33	..	18	..	36	..	16	..	32	..	12	..	9	..	25	..	98	..	59	..	84	..	14	..	27	..
1	5	4	6	9	5	2	15	11	4	..	3	4	7	5	1	19	16	..	5	..	7	..	..	..	..
2	2	1	2	2	6	1	4	3	2	..	..	..	..	84	2	159	15	80	2	112	..	21	..	60	1
7	12	11	19	25	14	29	15	45	27	4	3	10	15	9	11	36	13	10	16	21	14	6	..	15	6
4	2	..	..	..	..	..	..	..	..	1	..	7	..	..	..	..	1	5	..	7	..	..	..	3	..
2	..	..	..	..	..	3	..	1	..	..	..	4	..	12	..	20	..	4	..	14	..	12	..	37	..
3	24	..	20	4	19	2	20	4	52	3	26	6	56	4	39	7	71	3	37	3	60	1	9	1	27
2	15	3	12	3	26	..	..	..	..	..	11	..	13	..	9	..	123	..	11	..	22	..	9	..	32
..	..	3	..	5	..	..	..	..	..	..	..	2	..	5	..	1	..	4	..	3	..	4	..	7	3
11	6	4	..	9	..	8	..	18	..	4	1	7	..	7	..	2	..	2	..	5	..	5	..	13	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	..	11	..	23	..	85	..	62	..	37	..	83	..	21	..	119	..	102	..	164	..	96	..	282	..
3	..	..	..	..	..	..	..	1	..	2	..	13	..	1	10	15	4	26	..	53	..	..	..	..	..
1	..	..	..	..	..	..	..	..	..	5	..	16	..	10	..	26	..	22	..	43	..	9	..	17	..
7	..	11	..	26	..	5	..	12	..	3	2	1	1	7	..	7	..	7	..	8	..	6	..	8	..
10	2	27	..	29	1	6	5	26	9	18	1	28	12	16	9	32	13	25	4	44	20	6	9	37	18
..	..	4	..	3	..	6	..	17	..	2	..	6	..	2	..	18	..	28	..	42	..	6	..	19	..
10	..	1	..	6	..	..	..	2	..	10	..	13	..	2	..	5	..	4	..	8	..	1	..	20	..
..	44	..	12	..	27	..	8	..	7	..	4	..	7	..	16	..	19	..	21	..	18	..	4	..	14
..	..	..	18	..	46	..	25	..	43	..	11	..	37	..	22	..	24	..	4	2	14	4	..	19	4
4	5	7	5	22	9	9	6	32	12	4	..	9	..	25	3	32	3	6	..	16	..	7	..	11	3
20	..	7	..	23	..	15	4	34	8	23	5	59	19	36	18	131	48	81	27	111	47	33	30	93	59
5	..	3	..	10	..	4	..	22	..	9	..	24	2	..	..	44	..	23	..	10	3	3	..	41	4
1	..	3	..	..	..	..	..	5	..	4	..	..	..	2	..	20	..	4	..	13	..	3	..	7	..
19	1	6	..	10	..	13	..	41	3	8	1	11	..	17	..	38	..	20	..	40	..	7	..	20	..
21	..	7	..	28	3	25	..	53	..	24	..	30	..	14	..	30	3	37	..	50	..	11	6	27	26
3	..	2	2	3	1	..	..	4	1	9	..	20	..	2	7	8	14	7	8	9	1	..	..	..	..
6	..	12	..	31	..	8	..	24	..	5	3	5	1	13	..	18	..	20	..	52	..	..	..	..	..
3	51	..	25	3	47	..	30	..	59	..	13	2	21	..	12	2	22	1	4	1	12	..	..	3	4
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
..	20	..	2	1	10	..	1	..	17	..	6	..	12	..	1	..	13	1	5	..	12	..	4	..	11
..	..	..	..	..	..	..	..	1	1	1	9	4	16	3	2	14	36	7	14	9	31	..	6	3	9
2	11	..	..	..	..	..	..	1	3	..	..	..	..	1	12	4	26	5	29	4	62	1	13	1	34
..	..	..	..	..	..	..	..	1	6	..	..	..	..	1	5	1	10	2	4	1	10	.	..	..	..
2	11	3	7	1	9	..	5	..	12	..	3	..	22	..	10	3	46	..	4	..	12	..	..	..	..
32	18	102	16	189	38	35	15	116	35	28	11	52	28	37	13	46	20	15	10	31	13	..	..	..	..
..	52	..	28	..	48	..	27	..	50	..	12	..	43	..	23	..	67	..	19	..	28	..	3	..	26
..	..	..	..	..	..	12	8	21	16	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	..	22	..	26	..	14	..	28	..	11	3	16	7	8	..	26	4	10	7	29	9	13	3	15	9
..	..	..	..	..	..	5	..	2	..	4	..	9	..	3	..	13	..	10	..	27	..	2	..	..	..

	Stations.	Hospitals.	JANUARY.				FEBRUARY.				MARCH.				APRIL.				MAY.		
			A		B		A		B		A		B		A		B		A		
			a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a
Nor Div.	Broach	Jail Hospital	..	..	..	..	1	..	..	..	..	..	..	..	4	..	2	..	..	..	3
	Do.	Police Hospital	6	..	17	..	2	..	3	..	3	..	4	..	9	..	9	..	2	..	7
	Kaira	1st Company 4th Batt. Art.	2	5	9	21	..	..	..	..	..	..	..	..	5	3	2	16	1	9	8
	Do.	Civil Hospital	..	..	..	..	15	..	..	..	5	..	..	..	2	..	2	..	..	..	..
	Do.	Jail Hospital	..	..	..	..	..	..	..	..	12	..	30	..	3	..	7	2	1	..	5
	Do.	Guzerat Provincial Battalion	5	5	9	10	4	10	7	18	..	..	..	..	..	..	..	..	..	..	..
	Bhooj	1st Grenadier Regiment N. I.	5	3	5	8	6	..	15	14	..	..	..	..	..	2	13	..	4	..	5
	Dwarka	Detachment 1st Gren. Regt. N. I.	2	3	..	..	2	..	8	..	..	..	..	..	..	..	..	..	..	..	..
Southern Division.	Belgaum	2nd Company 1st Batt. Art	..	..	..	..	1	..	..	..	3	..	4	..	1	1	9	9	6	3	10
	Do.	83rd Foot	1	12	..	74	1	4	..	18	..	6	..	22	..	8	..	16	..	4	1
	Do.	18th Regiment N. I.	2	..	3	..	3	..	..	..	3	..	6	..	..	..	9	..	2	8	3
	Do.	24th Regiment N. I.	3	6	5	9	3	4	2	8	1	..	3	2	..	..	5	8	2	2	1
	Do.	Civil Hospital	..	9	8	20	..	..	2	9	3	7	14	16	2	2	7	8	3	9	2
	Dharwar	Civil, Jail and Police Hospital	1	..	..	..	1	..	3	4	1	9	5	23	2	6	4	7	1	..	8
	Kulludghee	7th Regiment N. I.	2	5	6	5	3	16	8	7	6	7	11	17	3	9	7	18	2	1	5
	Do.	1st Regiment S. M. Horse	4	23	8	22	3	5	..	11	4	3	3	11	6	21	7	13	5	12	5
	Do.	2nd Regiment S. M. Horse	..	12	2	23	1	3	6	8	1	..	3	1	1	16	13	19	2	9	7
	Do.	3rd Regiment S. M. Horse	..	5	4	7	3	13	4	6	1	..	4	6	1	5	6	7	4	8	10
	Kolapoor	2nd Company 2nd Batt. Art.	5	2	10	15	5	12	11	9	1	3	5	3	..	..	..	..	..	..	..
	Do.	10th Regiment N. I.	3	12	6	24	1	9	3	15	3	..	19	..	12	..	13	..	6	..	14
	Do.	Civil Hospital	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	18	..	26
	Do.	Jail Hospital	2	..	24	..	10	2	29	2	6	..	20	..	8	1	12	7	9	..	14
	Do.	Police Hospital	2	..	2	..	3	..	7	..	4	..	1	..	15	..	7	..	8	..	19
	Rutnagherry	Civil Hospital	..	5	2	19	..	1	..	9	7	2	6	2	21	13	17	19	..	2	4
	Do.	Jail Hospital	1	..	2	..	3	..	1	..	5	..	6	..	6	..	6	..	18	..	16
	Sawunt Warree	Jail Hospital	..	..	2	..	..	..	2	..	..	..	5	..	5	..	8	..	11	..	23
	Do. Do.	Police Hospital	..	..	..	..	..	..	11	..	..	..	15	..	5	..	8	..	17	..	38
Sind Division.	Kurrachee	4th Company 3rd Batt. Art.	..	..	1	1	1	..	..	..	..	..	..	..	2	..	..	..	..	..	1
	Do.	3rd European Regiment	5	10	8	12	2	1	..	..	2	1	..	2	2	1	3	..	6	7	5
	Do.	64th Foot	3	8	4	7	2	1	5	16	..	..	4	..	..	..	..	..	..	..	..
	Do.	1st Belooch Battalion	1	..	..	3	1	..	2	7	2	..	2	3	3	4	4	8	3	..	3
	Do.	Civil Hospital	..	32	..	61	..	32	..	42	..	58	..	141	..	25	..	62	..	84	..
	Do.	Jail Hospital	36	39	85	111	1	60	6	126	3	130	1	248	..	64	..	144	..	44	1
	Do.	Police Hospital	..	16	..	54	..	47	..	88	1	28	3	74	5	32	8	77	..	21	..
	Hydrabad	2nd Troop H. B.	1	..	..	..	9	..	5	..	..	..	5	..	2	..	1	..	2	..	5
	Do.	3rd Company 1st Batt. Art.	..	13	..	8	..	8	..	9	..	..	..	..	1	4	..	..	2	..	9
	Do.	Detachment 3rd Eur. Regt.	..	..	..	1	..	1	1	1	..	..	4	..	1	2	..	1	..	..	..
	Do.	2nd Belooch Battalion	9	..	27	3	4	..	14	..	5	..	6	..	7	..	30	..	10	..	16
	Hydrabad	Civil Hospital	..	..	3	..	3	..	..	5	2	..	..	..	..	..	..	2	..	..	..
	Do.	Jail Hospital	4	..	6	1	..	..	..	..	4	..	7	..	2	2	2	2	1	..	3
	Do.	Police Hospital	..	3	..	2	4	..	7	..	6	4	11	2	4	4	9	19	..	..	4
	Shikarpoor	Civil and Police Hospital	2	..	12	..	1	1	7	..	4	..	5	..	3	..	10	..	8	..	1
	Do.	Jail Hospital	1	..	3	..	..	..	2	..	..	..	2	..	1	..	6	..	15	..	2
	Jacobabad	1st Regiment Sind Horse	2	..	20	..	3	2	9	..	11	..	19	..	..	..	..	..	..	..	..
	Do.	2nd Regiment Sind Horse	..	..	4	..	7	..	6	..	3	3	20	7	..	..	..	..	..	..	..
Mhow Division.	Mhow	Do. Battery H. B. Royal Artillery	1	..	4	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Do.	4th Company 2nd Batt. Art.	1	..	1	..	.	..	..	..	..	..	4	..	..	4	8	6	..	1	3
	Do.	3rd Dragoons	..	..	..	..	..	..	..	..	..	..	1	1	1	..	1	..	..	..	..
	Do.	72nd Highlanders	1	2	3	8	..	8	..	3	..	..	..	..	..	..	..	..	2	..	..
	Do.	4th Regiment N. I.	..	..	4	..	..	..	..	..	1	..	..	1	2	11	3	11	..	..	..
	Do.	9th Regiment N. I.	..	..	2	5	..	..	..	..	..	..	1	1	..	..	..	..	..	..	..
	Nusseerabad	3rd Troop H. B.	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3	..	3
	Do.	28th Foot	5	11	9	28	7	3	9	7	5	3	21	8	7	..	24	1	..	..	..
	Do.	1st Regiment Light Cavalry	13	..	37	..	11	..	21	..	3	10	3	8	4	6	5	6	2	1	..
	Do.	12th Regiment N. I.	3	..	5	..	12	..	2	..	1	..	10	..	..	..	2	..	..	..	..
	En route to Nusseerabad	Squadron 3rd Dragoons	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8	..	..
	Neemuch	6th Batt. 13th Brig Royal Art.	1	..	9	3	2	2	..	..	..	4	9	3	3	9	13	8	..	4	..
	Do.	2nd Bombay European Regiment.	12	..	27	..	..	..	..	..	4	..	15	1	9	2	26	2	4	1	..
	Do.	Left Wing 95th Foot	2	15	5	42	..	4	3	3	3	34	4	39	6	49	6	95	4	61	..
	Do.	2nd Regiment Light Cavalry	..	..	..	2	..	..	..	..	..	2	..	12	..	5	..	9	..	8	..
	Do.	13th Regiment N. I.	..	31	3	58	1	3	..	11	..	7	1	12	..	29	..	29	..	11	..
Aden.	Indore	Detachment 4th Regiment N. I.	13	..	27	..	25	..	40	..	30	..	59	..	..	..	..	..	..	..	..
	Mundlaisir	Detachment 4th Regiment N. I.	18	11	10	6	..	13	13	11	10	13	19	17	..	..	..	..	..	..	..
	Aden	5th Batt. 13th Brig. Royal Art.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	Do.	Right Wing 4th (K. O.) Regt.	1	5	5	9	3	6	1	1	2	3	4	17	1	6	6	11	4	4	4
	Do.	15th Regiment N. I.	8	..	16	..	13	..	30	..	..	..	..	..	36	..	88	..	27	..	4
	Do.	Sappers and Miners	..	..	2	..	4	..	1	..	3	..	3	..	..	..	..	..	..	..	..
	Do.	Civil Hospital	2	..	..	..	..	..	..	..	3	..	16	..	4	..	17	..	6	..	1
	Do.	Jail Hospital	3	..	9	..	..	..	..	..	1	..	37	..	6	..	4	..	5	..	

	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a
Totals	872	731	1,830	1,556	562	625	1,092	1,162	529	611	1,145	1,286	610	738	1,247	1,327	541	684	1,08
Totals	1,603		3,386		1,187		2,254		1,140		2,431		1,348		2,574		1,225		
	A		B		A		B		A		B		A		B		A		

UNE.		JULY.				AUGUST.				SEPTEMBER.				OCTOBER.				NOVEMBER.				DECEMBER.			
B		A		B		A		B		A		B		A		B		A		B		A		B	
a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	..	6	..	8	..	3	..	12	..	15	..	23	..	4	5	29	10	19	..	33	6	7	..	17	..
7	..	11	..	11	..	..	..	3	..	4	..	22	..	21	..	52	..	30	3	39	..	..	..	..	..
..	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
1	2	10	..	12	..	2	..	11	2	7	..	12	..	18	..	31	2	5	..	2	2	1	..	2	..
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12	..	19	..	35	..	5	..	23	..	15	..	31	..	50	..	142	..	165	25	284	67	21	29	42	63
..	..	20	20	29	43	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	11	..	2	1	3	..	..	2	..	2	..	..	..	..	..	7	..	..	..	2	..	..	..	..	..
11	6	..	..	..	15	..	34	..	29	..	21	..	9	..	5	1	29	..	4	..	5	3	..	7	10
..	2	3	3	5	..	..	2	..	7	2	..	..	..	2	..	..	..	1	3	..	9	1	..	4	10
4	7	..	..	1	..	1	3	3	2	..	..	..	..	..	..	2	1	2	8	7	13	..	..	2	5
8	11	2	3	7	9	4	6	4	8	3	8	1	13	..	3	4	9	1	8	2	18	1	1	3	12
29	..	13	..	32	..	3	..	4	..	1	..	11	..	10	..	20	..	15	..	4	..	23	..	74	..
6	2	3	..	3	6	3	1	5	6	2	3	3	4	1	4	1	9	3	5	22	9	4	6	1	4
9	27	3	20	17	64	5	10	5	26	..	..	..	..	..	..	..	..	..	..	2	..	..	..	.	..
4	5	1	3	3	7	4	13	7	22	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	23	..	8	3	18	2	7	5	28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
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14	..	5	..	10	1	6	..	19	..	5	..	13	.	1	..	16	..	17	..	18	..	5	..	7	..
7	2	..	..	..	..	3	..	11	..	..	..	1	..	4	..	16	..	..	..	..	..	..	..	..	..
18	..	2	..	11	..	1	..	14	..	15	16	12	4	14	2	30	6	11	..	5	..	12	..	20	2
18	..	9	..	..	..	7	..	10	..	10	..	21	..	13	..	43	..	17	..	18	..	12	..	34	..
5	15	4	4	8	11	15	4	47	4	15	3	18	12	..	5	..	6	4	10	4	14	..	13	..	19
7	..	..	..	..	..	..	..	..	..	5	..	2	..	7	..	2	..	1	..	11	..	2	..	1	..
28	..	4	..	9	..	..	..	1	..	3	..	7	..	6	..	..	..	..	..	14	..	2	..	17	..
22	4	10	..	24	6	11	..	5	..	6	..	3	..	5	..	15	..	14	4	16	10	3	1	14	..
..	..	..	..	1	..	..	..	2	..	..	..	..	..	1	..	2	..	1	..	2	..	..	..	..	..
5	3	1	..	3	..	1	2	3	2	3	3	2	2	2	3	2	4	8	5	11	8	1	..	7	4
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15	3	4	..	10	1	..	..	..	..	..	..	..	..	10	14	31	38	..	..	..	..	..	6	6	15
8	242	1	70	10	172	..	23	..	33	..	25	..	40	..	18	..	29	..	21	..	32	..	29	..	57
..	82	..	32	..	74	..	73	..	124	..	54	..	69	..	75	6	85	..	28	..	32	..	18	..	46
..	40	..	24	..	38	..	2	..	6	..	10	..	12	..	19	..	70	..	31	..	74	..	16	..	58
..	..	2	..	2	..	..	..	..	..	..	..	..	..	..	..	8	..	..	..	..	..	..	..	..	..
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2	2	4	..	3	2	..	..	..	..	..	..	5	1	1	8	1	1	4	1	16	..	5	..	17	..
..	10	1	5	7	7	..	..	..	..	1	8	14	18	13	8	28	15	17	27	25	37	..	..	..	..
8	..	4	..	5	..	3	..	..	14	8	..	22	..	36	..	92	..	46	..	88	..	12	..	31	..
6	..	1	..	5	..	1	..	3	..	2	..	12	..	15	..	39	..	5	..	25	..	5	..	8	..
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..	..	6	1	31	6	17	4	28	9	33	17	41	16	9	11	17	33	16	..	30	1	9	1	6	17
..	..	3	..	12	..	7	1	19	4	11	5	7	4	6	..	9	2	..	2	5	8	..	..	..	..
3	1	0	..	12	3	8	..	24	..	21	..	33	..	19	1	43	1	13	..	23	..	7	5	14	4
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..	..	2	..	2	..	11	..	21	..	8	..	19	..	4	..	9	..	..	..	..	..	..	..	..	..
7	5	..	..	..	..	3	28	9	78	6	35	20	138	15	26	45	65	13	37	19	46	2	1	8	9
1	35	4	25	2	40	5	13	5	32	15	99	77	358	12	102	31	123	4	35	4	45	1	..	1	2
11	..	4	..	5	..	29	..	76	..	79	..	164	..	87	..	173	..	40	2	93	4	31	..	48	..
..	..	..	..	..	..	21	..	34	..	27	23	38	62	12	19	26	38	5	5	8	18	6	7	7	
																									3
65	26	9	6	23	19	6	3	16	26	21	11	55	23	31	26	62	40	17	40	21	67	3	11	10	43
18	2	18	4	16	8	22	8	56	9	55	20	78	78	32	61	42	155	16	85	32	155	2	43	6	96
2	91	..	58	..	101	1	58	..	118	1	53	3	86	1	27	2	54	..	17	1	29	..	..	..	..
..	5	..	4	..	4	..	7	..	11	..	12	..	26	..	15	..	56	..	12	..	38	..	1	..	6
..	12	..	5	..	27	..	33	..	91	..	84	..	169	..	168	..	544	..	236	..	501	..	103	..	254
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	..	1	..	1	..
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	17	..	20	6	61	14	2	3	7	6
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1	2	..	..	..	..	..	..	..	..
..	..	2	3	2	8	1	3	..	..	2	3	2	8	1	2	3	7	2	3	3	7	1	..	1	9
63	..	15	..	20	..	20	..	49	..	31	..	58	..	35	..	71	..	51	..	5	..	29	..	78	..
1	..	3	..	2	..	..	..	3	..	4	..	1	..	5	..	2	..	7	..	17	..	5	..	2	..
18	..	4	..	11	..	2	..	2	..	4	..	6	..	3	..	9	..	..	..	6	..	..	..	8	..
..	..	4	..	8	..	5	..	9	..	7	..	4	..	10	..	40	..	20	..	26	..	25	..	59	..

a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b	a	b
1,079	1,349	692	733	1,355	1,525	741	775	1,542	1,490	834	831	1,567	1,813	1080	960	2,704	2,607	1421	1193	2,498	2,230	645	563	1,600	1,414
2,423		1,425		2,880		1,516		3,032		1,665		3,380		2,040		5,371		2,614		4,728		1,208		3,014	
B		A		B		A		B		A		B		A		B		A		B		A		B	

NOTES, SANITARY AND MEDICAL, ON COLABA, BOMBAY, AS A MILITARY STATION.

By WILLIAM HANBURY, Esq., Surgeon, H. M.'s 33rd (Duke of Wellington's) Regiment.

Presented December 1862.

In a paper published in the 7th Volume of the Transactions of the Medical and Physical Society of Bombay, I invited attention to a form of Fever known to be the direct result of over-crowding and defective Sanitary conditions, which occurred at Deesa in 1859, illustrated the marked effects produced on the health of the Troops by the removal of these causes of disease, and vindicated the climate from the charge of unhealthiness.

On the present occasion I purpose to bring forward certain facts which seem to prove that the character of insalubrity which has so long attached to Colaba as a Military Station is to be referred to causes equally preventable, and that the climate of Bombay is not in itself unfavourable to the soldier's efficiency and health.

I shall be pardoned if I introduce the subject with a few details, showing the unusual exemption from disease which the Regiment has enjoyed since the first of these papers was written.

During the year 1862 the Head Quarters of the 33rd Regiment was stationed at Colaba, while two Companies were quartered at Ahmedabad, one at Surat, one at Asseerghur and two at Sattara. The average daily strength of the Regiment was 1005, the daily average sick 44, and the number of deaths (exclusive of one case of suicide) 14; the former being in the proportion of 43·8, and the latter 13·9 per thousand of strength.

The subjoined Table shows the extent to which the sickness and mortality were determined by the different classes of disease.

	Strength 1005·75.		Annual ratio per thousand.	
	Admitted.	Died.	Admitted.	Died.
Class 1.				
Miasmatic diseases	952	11	1273·6	10·9
Enthetic ,,	307	..		
Dietic ,,	13	..		
Parasitic ,,	9	..		
Class 2.				
Diathetic diseases	1	..	13·9	·9
Tubercular ,,	13	1		
Class 3.				
Diseases of Nervous System	21	..	291·3	1·9
,, Circulatory ,,	13	..		
,, Respiratory ,,	10	..		
,, Digestive ,,	115	2		
,, Urinary ,,	6	..		
,, Reproductive ,,	11	..		
,, Locomotive ,,	4	..		
,, Integumentary,,	113	..		
Class 4.				
Development diseases	4	..	2·9	....
Class 5.				
Violence, deaths or diseases	87	..	86·5	....
Total....	1,678	14	1668·4	13·9

It should be observed that 9 of the 14 deaths recorded were the result of cholera, and I may remark that it is the occurrence of this disease alone which has hitherto caused the mortality rate in the Regiment to exceed that of the army generally in England. Were we at liberty to eliminate cholera from the returns (from which most other colonies are free) and to take into consideration diseases of endemic origin only, the mortality would be reduced to less than 5 per 1,000 of strength, whereas it was 10 per 1,000 of strength in the United Kingdom in 1860.

It appears moreover that the average sick time to each

soldier and the average duration of the cases were greater in the army at Home than in the Regiment; in a word, that the soldier in India occupying widely-distant stations proves a higher state of efficiency and greater exemption from disease than are observed in England, and if we further refer to the previous year, the same fact comes out still more strongly, for only *four* deaths occurred from *all causes* out of an average strength of nearly one thousand men.

The following Table shows the extent to which disease prevailed, and the influence of Season upon health at the different Stations occupied by portions of the Regiment during the year.

1862.	Colaba.		Ahmedabad.		Asseerghur.		Sattara.		Surat.	
	Average Strength 426.		Average Strength 157.		Average Strength 86.		Average Strength 204.		Average Strength 57.	
Months.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
January	42	1	..	..	27	..	19	..	10	..
February	58	4	..	..	14	..	17	..	16	..
March	54	..	11	..	15	1	34	2	12	..
April	40	..	11	..	5	..	79	..	14	..
May	42	..	13	..	4	..	51	..	9	..
June	52	1	17	..	12	1	23	..	13	..
July	62	..	22	..	12	..	26	..	18	..
August	33	..	17	..	21	1	37	..	10	..
September	35	..	29	..	14	..	50	..	10	..
October	42	..	58	..	23	..	51	..	8	..
November	35	2	50	..	26	..	34	..	13	..
December	33	..	32	..	34	..	27	..	2	..
Total	528	8	260	..	207	3	448	2	135	..
Proportion of average Sick to average Strength per cent.	3·7		4·2		6·6		4·6		7·5	

One of the deaths not noted here occurred from cholera at the Sanitarium of Poorundhur, and I may, in passing, refer to the curious and suggestive fact, that the appearance of cholera in almost every instance since the Regiment arrived in India, has been connected with its movements from place to place. Thus in 1858 one case, the only one which occurred, took place on the line of march. In 1860, an officer contracted the disease on the march to Aboo with a detachment, and the disease broke out in a detachment which arrived at Deesa from Aboo about six weeks later, and proved fatal in 24 cases, while 20 men of the Regiment in the same year contracted cholera immediately after their arrival at Baroda from Dwarka, and lost ten per cent. of their strength. In 1862 two Companies of a Wing of the Regiment brought the disease from Surat into Bombay, where four men of the detachment died, while the other two Companies which marched back to Ahmedabad escaped cholera, though encamped on the same ground at Surat close to the 12th Native Infantry Regiment, in which the disease prevailed. A little later, some men of the two Companies which imported the disease from Surat to Bombay were sent to Sattara, and two of them died on arrival, the disease having shown itself two marches from that place. Lastly, in November 1862, ten men were sent to Poorundhur from Sattara for change of climate, and one of these died from cholera the day after they arrived at that Sanitarium.

Without further reference however to the history of the Regiment generally in this place (which is interesting enough of itself) I confine my attention at present to the Head Quarters of the Corps stationed in Colaba since the 3rd December 1861, with a view to compare the results as expressed in disease, with similar facts in the Medical history of the Station during former years. If the conclusions arrived at from the statement about to be submitted go even but a short way to rescue Colaba from the bad reputation which has so long attached to it as a Military Station, it will not be deemed altogether devoid of interest. And should it further appear that a body

of men has lived in the midst of an unhealthy community in the enjoyment of a very high standard of health, it will not be without some value as pointing to the fact that disease in Bombay is not so much the product of climate as the manufacture of our own hands, which we can put a stop to, albeit with difficulty and at some cost, if seriously-minded to do so. The question of Sanitary reform, which is now happily engaging so much attention in Bombay, may well submit to derive encouragement and support from any fact, however humble, illustrating local instances of unusual and peculiar exemption from disease; and it seems important specially to mark such an instance with reference to Colaba, for while it would appear to be the intention of Government to erect barracks in Bombay for another Regiment of European Troops, it has, I believe, been more than once under contemplation, on account of the presumed unhealthiness of the barracks at Colaba, to remove them to a more suitable locality.

On referring to the Mortuary Returns of Bombay of 1861, we find that Colaba is one of the districts in which the death rate shows an increase in the six years between 1855 and 1860, as compared with the six preceding years, but though it is known to be at all times unhealthy, it is not possible for want of a correct census to state the exact proportion of deaths to population. As we are not however concerned with this subject at present further than to indicate that Colaba generally shares the Sanitary character which belongs to other parts of the Island, I shall limit my observations to the Barracks and Troops.

The Sanitary Report of the Medical Department of the Army for 1860, framed on the recorded experience of Medical officers in previous years, contains the following notices:—

"The condition of the Barracks at Colaba and in the Fort of Bombay is of the worst, low, damp, ill-ventilated and badly constructed, they are said to be quite unfit for the purpose for which they are still used. Colaba and Bombay are malarious

to a degree that would demand their abandonment on sanitary grounds alone, if that were possible." "The old condemned Barracks at Colaba and in the Town of Bombay should give place to more appropriate buildings on a more healthy site," and adds, "the European Regiment (28th Foot) stationed at Nusseerabad was represented as suffering from impaired health, the result of previous service in Colaba and in the Town Barracks of Bombay." His Excellency Sir H. Rose referring to the unhealthiness of the station observes: "Sometime after H. M.'s 57th Regiment left Bombay, the Brigadier Commanding at Ahmednuggur reported officially that one-third of this fine Regiment was still suffering from fever caught in Bombay." "When H. M.'s 28th Regiment of Foot embarked from Bombay against Beyt, they left considerably upward of one hundred men sick from the same illness."

These remarks, coming as they do from such weighty authority, the Commander in Chief-in-India, and the Head of the Sanitary branch of the Army Medical Department, carry with them their own approval; and from all I have been able to collect, I have no doubt their application might be extended over a long series of years, and to many other Corps in the Service. To refer however only to one more example, I may be permitted to observe, that the Regiment which was last quartered in Bombay suffered much from sickness, and left the Station in a very shattered condition, which has since told sensibly on the mortality rate.

Such are the facts constituting the Medical history of Colaba as a Military station in former years, and we have now to see how far they fall in with the experience acquired in the year just elapsed.

The Head Quarters of the 33rd Regiment arrived in Bombay on the 3rd December 1861, the average strength during the year was 426, the daily average sick 15·7 or 3·7 per cent. of strength, the mean sick time to each soldier 13·6 days, and the average duration of the cases 10·8 days. These results speak for themselves,

they are not only highly satisfactory and widely at variance with those of former years, but stand out in favourable contrast to those recorded of Troops in the United Kingdom, and establish the fact that the soldier has been more effective in Colaba than in the Army at Home. With regard to the mortality, it is of course obvious that it cannot for so small a number of men be made the subject of comparison with the same confidence as the amount of sickness admits of, for a slight accident, or other contingency here disturbs the result and renders it useless for statistical purposes; but as four of the eight deaths returned were caused by cholera imported by a detachment from Surat, and one of these occurred on board ship in the harbour, and the other three among *men* of the detachment two days after they landed at Bombay, it will be admitted the facts even in this particular are favourable to Colaba. Nor is this all, for of the four remaining deaths, one occurred in January 1862, the subject of which arrived at Bombay from Deesa in a dying state from dysentery and consumption, and two were the result of cholera, which was doubtless contracted from contact with the native population, since the disease found itself unable to spread in the barracks. So that the true result to arrive at is this, namely, that only one death at all referrible to the barrraks and station of Colaba took place, or a proportion for the fourteen months the station has been occupied, equivalent to 2·0 per thousand of strength per annum. Moreover, so complete is the absence of disease as I now write, that there is not a single case of fever or dysentery in Hospital, not a single man confined to his bed, In a word, of the diseases under treatment all, except two cases, range themselves under the head of surgical complaints; and I have never known Troops in any climate whose physical efficiency was more satisfactory, or who enjoyed greater exemption from serious disease of every denomination.

In the presence of the facts now stated we almost involuntarily ask, to what causes is this unusually high standard of health to be referred? Was the circumstance a mere freak

of climate only not to be repeated again perhaps for many years? Is the experience of former years to be accepted as the normal state of things? or is the result in this instance to be considered the exponent, in a measure, of the degree of salubrity which the climate and locality *naturally*, and in the absence of disturbing conditions, are entitled to take credit for?

That the truth is to be found in an affirmative answer to the last of these questions I have no doubt whatever, and did I not think so, it will be easily surmised these remarks should not have been written, for on any other supposition comments on the facts would possess no importance and answer no useful purpose.

Of the conditions thus concerned in accounting for the sickness and mortality in excess of what I have thus assumed as the more natural standard of health, inadequate accommodation was the chief. For while I admit that defective drainage and ventilation were two of the conditions which hitherto to some extent affected injuriously the health and efficiency of the Troops at Colaba, and that the improvement which of late years have been made in both were probably followed by corresponding advantages, I must also at once repeat my conviction that to over-crowding in barracks *per se* was eminently due the '*unhealthy*' character for which the station has been so long notorious.

I am not in a position to muster all the facts which might be adduced as evidence of over-crowding in support of this opinion; these can only be obtained from the records of the department in the Presidency Medical Office, but I think there are details at my disposal quite sufficient for the occasion.

On the arrival of the Head Quarters of the Regiment at Bombay, I made official application to the Engineer Department for a statement or estimate of the extent and capabilities of the barrack accommodation at Colaba, and was informed in reply, that there were six barracks each 216 feet long and 22½ feet wide, and capable of accommodating 53 men, allowing 89·30

superficial feet and about 1,100 cubic feet (calculated on 12½ feet of the altitude) to each soldier. On further inquiry I learned that 4 patcherries containing 42 rooms were available for the same number of married men, and that a space sufficient to accommodate 25 men was partitioned off one of the barracks and appropriated to the Serjeants' Mess.

Thus it appears that the accommodation of barracks and patcherries taken together was only sufficient for 335 men, and no one, whose opinion is of any value, will venture to maintain that the allowance of space which on this estimate fell to the share of each soldier was excessive. Yet we find that in 1859 the barracks were occupied by an average strength of 801 men (a detachment doubtless in the Town barracks), in 1860 by an average strength of 581 men, and in 1861 by an average strength of 582 men, and it is easy to conceive that the number probably exceeded for two or three months at a time perhaps, the average strength for each of these years. It is needless to refer to periods more distant for further facts of the same kind to the dark day of ignorance and error, when the importance of a good ration of pure air to the soldier's health was little understood; they would possibly afford only more striking good examples of the extent to which the barracks were over-occupied, but I have heard, with what truth I cannot say, that beds have at times been placed not only along the side walls of these buildings, but also in the centre of the rooms and verandahs.*

Viewing these facts then in connection with the proofs of the unhealthiness of the Station in former years already given, and bearing in mind the high state of efficiency, and the extraordi-

* In turning over the pages of an old number of this Journal, I find that the 17th Regiment, while quartered in Colaba in 1841, lost 58 men from fever, or eight per cent. of strength. From these data we infer that the strength was 725, and yet the medical officer in summing up the causes of the disease makes no allusion whatever to overcrowding. The importance of a good ration of pure air to the soldier's health had not yet been fully appreciated even by the Military Surgeon. The writings and experience of a Pringle were still disregarded.

nary absence of disease enjoyed by the Head Quarters of the 33rd Regiment, in which the number of men corresponded more closely with amount of accommodation available, it will be admitted that there is much to justify the conclusion, that to over-crowding almost alone must be attributed a great part of that sickness and mortality for which the Station has been so unhappily distinguished. There are no other conditions which can possibly explain the different results exhibited. The improved ventilation and drainage were effected not last year, but a few years ago. The diet of the soldier has always probably been sufficiently varied and nutritious. The duties always more or less severe are now more so than ever, owing to the extent to which rifle practice is carried; and it is worthy of notice that the 33rd Regiment preserved its efficiency, though it became necessary, in order to extend the accommodation, to reduce the strength to such a degree by sending out detachments, that the average number of nights in bed during the year only amounted to $3\frac{1}{2}$ for each man.

It will here perhaps be objected that the experience of the Regiment is exceptional, the result merely of a particularly healthy season; if so, there is this to be said in reply—1*st*. They who urge this objection, to give any force to it, are bound to prove that last year was a peculiarly healthy year either in Bombay or Colaba, a thing they will find it difficult I think to do. 2*nd*. Climate in any locality as regards *endemic* disease at least is within very narrow limits a fixed quantity, and it is the conditions of life under our control which are subject to *variation* as agents in the production of disease.

I may here mention that I was so strongly impressed with the truth of these facts *à priori*, or previous to the experience upon which I may now appear to lay too much stress, that I wrote to the Commanding Officer on learning the limited extent of the accommodation, to the effect that grievous consequences would probably follow if the barracks were occupied by the number of men *en route* to Bombay with the left Wing from

Deesa; venturing at the same time to assure him that the men would in all likelihood maintain their high standard of health, if no over-crowding in barracks were permitted. These views fortunately coincided exactly with his own, and were put before the Commander-in-Chief. Two Companies were accordingly countermarched to Ahmedabad after their arrival at Surat, and 50 more men were detached from Bombay to reinforce two Companies which had been sent to Sattara sometime previously. Our prevision was as already shown justified by the results. These I maintain afford positive testimony that the climate of Colaba *per se* is not unhealthy, which any number of negative statements to the contrary cannot controvert; and I feel confident that had not the distribution of the Regiment been carried out in the manner just mentioned, no occasion would ever have arisen for writing these pages.

I believe, moreover, that Colaba possesses great natural advantages, in its admirable facilities for self-drainage, which demands little assistance from art, in its free exposure to the sea and land breezes, and its projection seaward beyond the influence of the densely peopled cities, and the filthy ill-drained localities so common in Bombay. So far from suggesting that the barracks should be removed to another site, I would record my opinion that they are adequate to the climate, and occupy as healthy a position as the Island affords; and in the event of additional accommodation being required in the neighbourhood, I would even recommend that the ground between the barracks and the Lighthouse on the Southern point of the Island should, if practicable (which I fear it is not), be cleared of its present occupants, and made available for the construction of new barracks. To conclude, Colaba appears to be a most eligible locality in a sanitary point of view for Military occupation, and assuming it is equally so in a Military sense, it is much to be regretted that native villages should have been allowed to grow up, and that the most desirable spots for building purposes should have fallen into the hands of private individuals.

If the conclusions thus arrived at find sufficient warrant in the facts upon which they are based, it is obvious that in order to maintain Troops at Colaba in a state of efficiency, the barracks in future should never be called upon to accommodate more than 430 or at most 450 men; but it is right that I should further mention that the satisfactory results obtained in the 33rd Regiment were, I think, partly to be attributed to the attention paid to sanitary arrangements, as well as to the fact that the purity of the barracks was preserved by lime washing the walls every week to a height of three feet above the floors. Whether the case as thus presented in these remarks may possess any importance in their application to the Island generally, must be left to the reader to decide. I think it is encouraging, and that it suggests (to say the least) the idea that sanitary improvements considered even as an investment of money and labour, likely to return good interest, is entitled to claim some confidence. Viewed in the light of science, the perversity with which we refer in popular language to the unhealthy climate of this or that place is extraordinary. Yet more than one Military Station has been abandoned at vast expense to the State on this ground alone, as far as proof is concerned. It would appear as if we assumed it to be the purpose of Providence, to render lethal and destructive to man that one condition of his life—Climate—over which he has so little control. A very little consideration of the climate and position of Bombay seems sufficient however to convince one that it is not *naturally* an unhealthy Island. The refreshing land and sea breezes, and the prevalence of the latter especially, must evidently not only serve to moderate the temperature, but carry away the atmospheric impurities which abound in large cities. The high tides give the island an obvious advantage over some cities in other warm latitudes—those of the Mediterranean for example—and provide for the effectual removal of sewerage matter. The heavy monsoon rain-fall washes off surface filth. Even the uniformly high temperature, and the small range of the Thermometer are not entirely without their merits, for they protect the resident from certain ailments which

sudden changes of climate elsewhere produce—notably consumption and other chest affections.

Experience indeed proves that persons whose comfortable condition implies the possession of good houses, and protects them from the evils of over-crowding, &c. in low, filthy ill-drained and closely-populated localities, enjoy good health for many years, provided they are careful to lead prudent and tolerably active lives, and if notwithstanding this the general mortality stands high, surely it is illogical in the extreme to connect the fact either with the climate or the geographical position of Bombay.

It is to man himself and to his violation of those laws of Nature which he has been given intelligence to interpret, or failing this, to misunderstand at his peril, that we must refer the excessive mortality in this as in many other instances, and it is to the practical recognition of this fact by the removal of these causes of disease which have accumulated by our own acts, and therefore under control, that we must look for the sanitary improvement of the Island. If, on the other hand, adopting the loose but dangerous phraseology so much in vogue we continue—whether from negligence or ignorance matters not —to libel the Author of Nature by attributing the results in a general way to climate, let us at least not be surprised if effect follows cause, with the most supreme indifference to our motives (which might even prompt us in a spirit of false humanity to leave the natives everywhere in undisturbed possession of filthy lanes and crowded hovels)—if the increasing mortality from endemic causes and more fearful invasions of epidemic pestilence demand from us still more authoritatively the instant performance of our duties.

That the necessity for such a call to duty should arise in this age of sanitary enlightenment would be disgrace to an Island in which wealth and intelligence so abound. That we have been spared hitherto the calamity of this dread warning is owing to the providential features of the climate above indicated,

I firmly believe; and for the sake of the magnitude of the interests concerned, I hope that the facts now advanced, and the remarks with which I have endeavoured to illustrate their meaning and significance, may receive more attention than they are entitled to, and that any feeble germs of instruction they contain may have the good fortune to fructify to the public benefit.

HOSPITAL STATISTICS OF EUROPEAN AND NATIVE TROOPS, PRISONERS IN JAILS, AND THE POLICE FORCE, IN THE BOMBAY PRESIDENCY, FOR FIVE YEARS, FROM 1856 TO 1860.

By W. C. COLES, M.D., (Edin.)

Presented February 1863.

The accompanying tables are in continuation of the Hospital Statistics of the Bombay Presidency heretofore published in the Seventh Volume of the Transactions, but limited to a review of the sickness and mortality amongst European and Native Troops, Prisoners in Jails, and Police. They are, however, considerably modified and condensed, compared with the series before given, and are intended to embrace at one view the sickness and mortality of the above mentioned classes. The five years over which the tables extend, relate probably to as an eventful period as ever before happened, or is likely again to occur, in the history of India. Each class referred to in the tables was affected to a greater or lesser degree by the events of the mutinies, especially the European and Native Troops of the Bombay Presidency, who not only served throughout the Persian Campaign in 1856-57, but were engaged in the operations undertaken in Central India, Oude, and Bengal, and constituted portions of the columns which led to the pacification of those Provinces.

It should be explained that although in the tables and in the commentary reference is made for the sake of convenience and brevity to the natural year, yet correctly speaking, each year alluded to commences upon the 1st of April of one year, and terminates upon the 31st of March of the following year. Hence

this series of tables embraces the five years from the 1st of April 1856 to the 31st March 1860. If this explanation is not borne in mind, some confusion will occur in comparing the data now furnished with that derived from other sources, and a charge of inconsistency or inaccuracy might be sustained. An apology is also due for the retention of a now almost exploded statistical nosology, but the tables were prepared at a time preceding the introduction of the new nomenclature; whilst leisure from other occupations has not permitted of the tables being re-arranged and adapted to the more modern classification of disease.

Tables No. 1 *and* 2.—European Troops.

Table No. 1 shows the strength, the sickness, and the mortality amongst European Troops during each year from 1856 to 1860, arranged according to the several Divisions of the Army.

The *strength* of the European Force in the Bombay Presidency during the five years under consideration fluctuated very considerably; thus in 1856, before the mutinies, there were only about 10,000 European soldiers, in 1857 there were upwards of 25,000, in 1858 the number decreased to 21,000, in 1859 to about 16,000, and in 1860 the strength was under 14,000 fighting men.

In Military Hospital returns no distinction can be drawn between a corps which is stationary, and another on a line of march, or only halted for a longer or shorter period; hence therefore the average annual strength of the whole computed from data liable to fluctuation is open to some degree of fallacy. Let us take for example, the years 1856 and 1857 in the Presidency Division. In Table No. 1 it is seen that the strength of the Europeans in 1856 was 659, and in 1857 nearly 5,000 men. The figures 659 in 1856 include a wing of a Regiment always stationed in Bombay,--a Company of Artillery,--and Invalids detained for a few weeks previous to embarkation. In the following year (1857) there was a large influx of European Troops into Bombay, who were halted for some considerable time preparatory to proceeding

up-country. Some of these men came under hospital treatment, and hence the strength of their corps appeared in the Hospital Books, and is shown in these returns. It follows, therefore, that it would be an error to suppose that because 4,936 is stated as the annual average strength of European soldiers at the Presidency in 1857, there were that number of men at one time in Bombay. After the excitement of 1857 was over, the European force in Bombay fell the next and each succeeding year, so that in 1860 the strength was almost to a man exactly the same as in 1856, or five years before. This remark however is not applicable to the other Divisions of the Army, because they were all of less numerical strength in 1856 than usual, owing to the withdrawal of about 3,000 European Troops to form part of the Persian Expeditionary Force. An examination of the table will show how the strength fluctuated in each Division during the five years; how a new Division (almost) Mhow, was formed; how Aden during 1857 was left with 175 men; and what was the strength of the Persian Force, and of the Columns in Central India, Oude, and Bengal.

Let us turn however to the hospital transactions during these years. It will be seen that at the commencement of the year 1856 of European Soldiers 647 "*remained*" in hospital from the preceding year, and that at the end of the year 1860, 770 patients were "*remaining.*" During these five years there had been no fewer than 159,378 soldiers "*treated*" in hospital, and that of these patients 2,424 had "*died.*" It is convenient, although not perhaps strictly correct, to consider the number of patients "*treated*" in hospital, which includes both those "*remaining*" and those "*admitted,*" as representing the amount of sickness, and throughout these tables the calculation of average percentage of sickness is based upon the "*treated*" in hospital, and not upon the admissions only.

If we compare then the total number of European Soldiers *treated* in hospital during these five years, with the strength of the British Forces during the same period, we find it as 159,378 is to 87,061, that is about 187 per cent., or in other words, every

1000 men passed through the hospital 1876 times. The year in which there was the largest amount of sickness was 1858, the "*treated*" in hospital amounted to upwards of 50,000, whilst the "*strength*" was about 21,500, the proportion being 223 per cent. or 2,237 per 1,000 strength.

This was the year after the mutinies, when not only was there a large number of unacclimatised soldiers, but when active operations were still going on, and when all the Field Forces were sending back their sick and wounded. But if we trace the year 1858 in the percentage columns at page 278, we shall see that the proportional sickness stood high in all the Divisions with the exception of Aden.

The average percentage of sickness for the five years shows that the Divisions can be arranged in the following order, according to the amount of sickness in each:—

Presidency	2,195 per 1,000	Rajpootana	1,765 per 1,000
Sind	2,160 „	Southern	1,690 „
Northern	2,014 „	Aden	1,368 „
Poona	1,965 „		

and that the most sickly years were as follows:—

1858	per 1,000	2,363	1856	per 1000	1,593
1859	„	2,237	1857	„	1,052
1860	„	2,131			

Mortality.—The total number of deaths for the five years was 2,424. The largest number occurred in the year 1858, viz. 776; then in 1857, viz. 547; next in 1859, viz. 482; then in 1860, viz. 425; and in 1856 only 194. Judged according to strength the total average mortality was 27 per 1,000—being in 1858, 36; in 1860, 30; in 1859, 29; in 1857, 21; and in 1856, 19 per 1,000. The highest percentage of deaths to treated was in Oude and in Bengal, where during the years 1857 and 1858, 353 European Soldiers of the Bombay Troops died; of these it will be seen, that 127 fell a prey to Cholera, and 76 lost their lives from wounds and

injuries; the percentage of mortality to strength being 174 per 1,000, and of mortality to treated 73.

The average rate of deaths to strength is highest at the Presidency, viz. 43 per 1,000. This high rate of mortality in Bombay has been pretty constantly observed, and is said to be due to the circumstance of invalids arriving from all other stations, to proceed to England, and in many cases dying previous to embarkation. The tables notably illustrate the above remark. In 1857, when "the strain was upon every man's nerve" there were comparatively few invalids sent to Bombay, and there were only 33 deaths, whilst the influx of Europeans was so great that upon comparing the deaths 33, with the average strength 4,936, the percentage is only about 6 per 1,000; notwithstanding that the general average everywhere else is 27, and in Bombay alone for the five years under consideration, it amounted to 43 per 1,000. In 1858 the death rate in Bombay rose to 36 per 1,000, in 1859 to 45, and in 1860 to 68 per 1,000, thus showing that, with the exception of 1857, it must be disease imported from without, which terminated fatally and increased the rate of mortality in Bombay.*

In the Northern Division of the Army there is a mortality percentage rate above the average, the year 1858 witnessing 33 deaths per 1,000 of strength; 1859, 30 per 1,000; and 1860 so high a proportion as 61 per 1,000; this excessive mortality having been due to the appearance of cholera in a fatal form amongst the European Troops at Baroda. It will be observed that whilst the variation in the total *average* of "deaths to strength" in five years extends only from 19 to 36 per 1,000, a wider range obtains in some Divisions. Thus, in the Poona Division, it varies from 14 to 40 per 1,000; in the Northern from 19 to 61; and in the Southern from 9 to 21. This is to be explained by bearing in mind that the liberation of Troops from

* By the establishment of the Khandalla Depôt, and the ready access of Bombay by rail, few Invalids have since 1860 been detained in Bombay, and the effect on the rate of mortality is deserving of observation in future years.

Central India and Bengal, necessarily swelled the list of the Division to which they returned, and that it was chiefly whilst they were absent that the low comparative rate of mortality prevailed.

Aden enjoys the privilege of exhibiting the lowest death rate of any station for European Troops in the Bombay Presidency. During the five years from 1856 to 1860 the range was from 3 to 24 deaths per 1,000 of strength, the general average of the five years being 12 per 1,000. In one year, indeed, (1859) not a single death happened to an European Soldier at Aden, and in the five years under consideration there was a total of only 21 deaths, a little more than 5 per annum. Of these 21 deaths, 8 were ascribed to fever, 3 to diseases of the lungs, and 2 each to diseases of the stomach and bowels, to diseases of the brain, to dropsies, to wounds and other diseases, but there was not a single instance of cholera.

If we turn now to the registered causes of death during the five years, (Table 2) we find that out of 2,424 deaths, 547 or about 22·5 per cent. were due to diseases of the stomach and bowels; 397 or about 16 per cent. to fever; 342 or about 14 per cent. to cholera; 323 or about 13 per cent. to diseases of the brain; 239 or nearly 10 per cent. to diseases of the liver; 191 or about 8 per cent. to diseases of the lungs; 161 or about 6 per cent. to wounds and injuries; and 126 or 5 per cent. to diseases not classified.

It is worthy of notice that there were only 29 fatal instances of eruptive fevers, and that of these 10 happened in Rajpootana and Mhow, 8 in Central India, 2 in Bengal during the time the troops were there engaged, whilst in the Poona Division there was about 1 fatal case a year, in the Northern Division and Bombay 1 in five years, and in the Southern 2 in the same period, showing forcibly that in stations near home, small-pox is not so inimical or so fatal a disease as it is to troops exposed to the hardships of field service.

Summary of Sickness and Mortality of European Troops for five years, arranged in years and Divisions, according to the amount of sickness or mortality in each.

General average ratio of sickness per 1,000 men	1,876
„ „ mortality to ditto	27
„ „ „ to 1,000 sick treated	15

Years in which the greatest ratio of sickness.

1858	per 1,000 men	2,363	1856	per 1,000 men	1,593
1859	„	2,237	1857	„	1,052
1860	„	2,130			

Divisions in which the greatest general ratio of sickness.

Presidency	per 1,000 men	2,195	Rajpootana	per 1,000 men	1,765
Sind	„	2,160	Southern ..	„	1,690
Poona....	„	1,965	Aden.....	„	1,368
Northern..	„	2,014			

Years in which the greatest ratio of mortality.

1858	36 per 1,000	men.	1857	21 per 1,000	men.
1860	30 „	„	1856	19 „	„
1859	29 „	„			

Divisions in which the greatest ratio of mortality.

Presidency	43 per 1,000	men.	Rajpootana	17 per 1,000	men.
Northern .	30 „	„	Southern..	16 „	„
Sind	23 „	„	Aden	10 „	„
Poona ..	20 „	„			

Tables No 3 *and* 4.—Native Troops.

The strength of Native Troops during the five years from 1856 to 1860 did not much vary. In 1856 it was a little over 35,000 and in 1860 about as much under 34,000. It increased in 1858 to above 38,000 and in 1859 to above 40,000, but fell the next year to 37,000.

The largest number of Native Troops is located in the Poona Division—about 9 or 10,000 men, then in the Northern, Southern and Sind Divisions, Rajpootana, the Presidency, and lastly

Aden, but in all Divisions a glance at Table No. 3 will show how little the strength has fluctuated. In the years 1856, 1857, and 1858, Native Troops of the Bombay Army were engaged in operations in the Persian Expedition and in Central India. The disbandment of two regiments scarcely affected the general result as the strength of other regiments was increased. At the beginning of 1856 there where 1,173 Native Soldiers in hospital, and at the close of 1860 there remained under treatment 809, being a difference less of 364. During the five years there were 222,389 admissions, which added to the remaining in hospital, constituted 229,406 patients treated, or in the proportion of 1,230 to every 1,000 men. The general average sick to strength varied little. It was highest in 1859, viz. 1,347 per 1,000, and lowest in 1860, or 1,111 per 1,000. The most sickly division for Native Troops is the Presidency, but the influences which tend to swell the list of sickness and mortality amongst Europeans are not to so great an extent in operation amongst Natives—(Bombay not being resorted to by invalids of the Native Army)—hence the causes must be sought for in Bombay itself. The average percentage of sickness to strength at the Presidency was in 1859, 2,070 per 1,000; in no year was it under 1,500 per 1,000, whilst the general average of five years reached to 1,720 per 1,000. Next to the Presidency, Sind has the highest general average percentage of sickness to strength, viz. 1,570 per 1,000; but it is singular how sickness in that province steadily abated. In 1856 the percentage was as high as 2,280 per 1,000, in 1857 it fell to 1,880, in 1859 to 1,296, in 1859 to 1,180, but rose slightly in 1860 to 1,200. After Sind, the Northern Division of the Army appears to be the most sickly, the general average percentage of sick to strength for five years being 1,423 per 1,000.

The healthiest place for Native Troops is Aden. It will be seen by the tables that only in two years the average percentage of sick rose above 1,000 per 1,000 and in the three remaining years much below; on one occasion indeed in 1859 being only 550 per 1,000. In Persia and Central India the Bombay Native Troops do not appear to have had any great amount of

sickness, but comparatively more in the latter than in the former campaign.

Mortality.—There were 2,162 deaths amongst Native Troops during the five years, which with reference to strength is about 11 per 1,000; the mortality of European Troops in the same situations and for the same periods was about 27 per 1,000 men. The chief causes of death were fevers, from which 611 casualties happened, or 28 per cent.; then cholera 339 cases, or 15 per cent.; diseases of the lungs, 287 cases, or 13 per cent.; diseases of the stomach and bowels, 280 cases, or 13 per cent.; other diseases, 206 cases, or 9 per cent.; wounds and injuries, 111 cases, or 5 per cent.

A singular immunity from small-pox seems to have occurred amongst Native Troops, as before remarked with reference to European Troops, as there were only 24 deaths in five years, the largest number occurring in the Poona and in the Presidency Divisions.

The following is a Summary of the Sickness and Mortality of Native Troops, arranged in years and in Divisions, according to the amount of sickness or mortality in each year or Division.

General	average	ratio	of	sickness	per 1,000	men.	1,230
,,	,,	,,	,,	mortality	,,	,,	11
,,	,,	,,	,,	,,	,,	treated.	9

Years in which the greatest ratio of sickness.

1859	per 1,000 men,	1,344	1857	per 1,000 men,	1,119
1856	,,	1,245	1860	,,	1,169
1858	,,	1,244			

Divisions in which the greatest ratio of sickness.

Presidency	per 1,000 men,	1,722	Rajpootana	per 1,000 men,	1,387
Sind.....	,, ,,	1,570	Southern	,, ,,	929
Northern....	,, ,,	1,433	Poona	,, ,,	925

Aden per 1,000 men, 832.

Years in which the greatest ratio of mortality.

1858	per 1,000	men,	13	1856	per 1,000	men,	18
1857	„		12	1860	„		8
1859	„		11				

Divisions in which the greatest ratio of mortality.

Aden	per 1,000	men,	22*	Sind	per 1,000	men,	11
Presidency ..	„		20	Poona	„		9
Northern....	„		12	Rajpootana ..	„		8

Southern per 1,000 men, 7.

Tables No. 5 and 6.—JAILS.

The number of prisoners confined in Jails in the Bombay Presidency and in Sind during the five years from 1856 to 1860 was a little over 6,000 per annum. In 1858 the number exceeded 6,500 and in 1860 there were fewer than in 1856. The largest number of prisoners is in the Poona and Sind Divisions, the smallest at Aden,—only from 150 to 170.

There were 379 prisoners sick in all the Jails throughout the Presidency at the beginning of 1856, and at the close of 1860 only 226 remained in hospital. During the five years there had been 45,411 admissions into hospital, and 1,218 deaths. The average ratio of "*treated to strength*" was about 1,500 per 1,000 individuals. The mortality to strength was about 38 per 1,000, and the deaths to the number per 1,000 treated about 25. The year of greatest sickness was 1856, when it amounted to upwards of 1,700 per 1,000 of strength, and the deaths to about 40 per 1000. In 1859, although there was not so much general sickness (the proportion being only 1,350 per 1,000 strength) yet the deaths reached to 43 per 1,000. It is the Jails of the Northern Division, or Guzerat, which prove most unhealthy—the average annual number of prisoners treated in hospital was 1,988 per 1,000 strength, and the mortality about 50 per 1,000. Next to the Jails in Guzerat, those in Sind have the highest sick and death ratios, the annual average

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* Due to an outbreak of Cholera.

percentage of treated to strength being 1,700 per 1,000 and the death ratio 38 per 1,000.

Mortality.—The chief diseases which prove fatal to prisoners may be classified as follows: diseases of the stomach and bowels, 25 per cent.; scurvy and other diseases, about 24 per cent.; cholera, nearly 15 per cent.; fever, 14 per cent.: diseases of the lungs, 11 per cent. &c.

The following is a Summary of the Sickness and Mortality of Prisoners for five years, arranged according to the amount of sickness and mortality in years and Divisions.

General average ratio of sickness	per	1,000	prisoners.		1,495
,, ,, ,,		mortality	,,	,,	38
,, ,, ,,	,,		,,	treated.	25

Years in which the greatest ratio of sickness.

1856	per 1,000 men,	1,715	1860	per 1,000 men,	1,380
1857	,,	1,641	1859	,,	1,356
1858	,,	1,384			

Divisions in which the greatest ratio of sickness.

Northern	per 1,000 men,	1,988	Southern..	per 1,000 men,	1,256
Sind	,,	1,702	Presidency.	,.	1,153
Poona ..	,,	1,439	Aden	,,	921

Years in which the greatest ratio of mortality.

1859	per 1,000 men,	43	1857	per 1,000 men,	36
1856	,,	40	1860	,,	35
1858	,,	38			

Divisions in which the greatest ratio of mortality.

Northern	per 1,000 men,	56	Pesidency .	per 1,000 men,	35
Sind....	,,	38	Southern..	,,	29
Poona ..	,,	36	Aden	,,	24

Tables No. 7 and 8.—POLICE.

The Police Force has been largely increased since the mutinies. In 1856 it numbered 11,332 individuals, and it appears to have steadily risen each year since that time, being

in 1857 upwards of 16,000, in 1858 more than 18,000, in 1859 nearly 20,000, and almost that number in 1860, or 19,629. By Table No. 7 the numerical strength is seen to have increased in all Divisions, the largest force being apparently kept up in Sind, and in the Northern Divisions. Compared to other branches of the public service, sickness is not common amongst the Police. When they enter hospital it is generally for some serious or fatal illness, as is proved by the high rate of percentage of "deaths to treated" compared to the extremely low rate of "deaths to strength." The beginning of 1856 found 182 Police men under hospital treatment throughout the Presidency and at the end of 1860 there were 234 remaining in hospital. During the period of five years there had been 44,277 admissions into hospital but the average annual ratio of treated to strength amounted only to 530 per 1,000,—a wide contrast to that of Prisoners in Jails which, for the same period, was nearly 1,500 per 1,000. The explanation offered is, that in some places—Bombay for example—the Police force is always kept up to its full strength, and that if a man is merely suffering from slight sickness he is not sent to hospital, but to his native country, and a substitute found to fill the gap caused by his absence. Hence the numerical strength of the corps appears to be large and the hospital admissions to be few. From these disturbing causes the hospital statistics of the Police force possess less interest or importance than those of other branches of the public service.

The following is a Summary of the Sickness and Mortality of the Police Force arranged in years and Divisions, according to the amount of sickness or mortality in each year or Division.

General average ratio of sickness for 1,000 men					530
,,	,,	,,	mortality	,, ,,	5
,,	,,	,,	,,	,, treated	11

Years in which the greatest ratio of sickness.

1857	per 1,000 men,	599	1858	per 1,000 men,	493
1860	,,	554	1856	,,	467
1859	,,	536			

Divisions in which the greatest ratio of sickness.

Northern ..	per 1,000 men, 664	Southern ..	per 1,000 men, 448
Sind.....	„ 607	Presidency.	„ 390
Aden	„ 566	Poona	„ 358

Years in which the greatest ratio of mortality.

1856	per 1,000 men, 7	1858	per 1,000 men, 4
1857	„ 7	1860	„ 4
1859	„ 6		

Divisions in which the greatest ratio of mortality.

Sind	per 1,000 men, 7	Poona	per 1,000 men, 4
Northern ..	„ 6	Southern ..	„ 3
Presidency.	„ 5	Aden	„ 3

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E. European Troops.
N. Native Troops.

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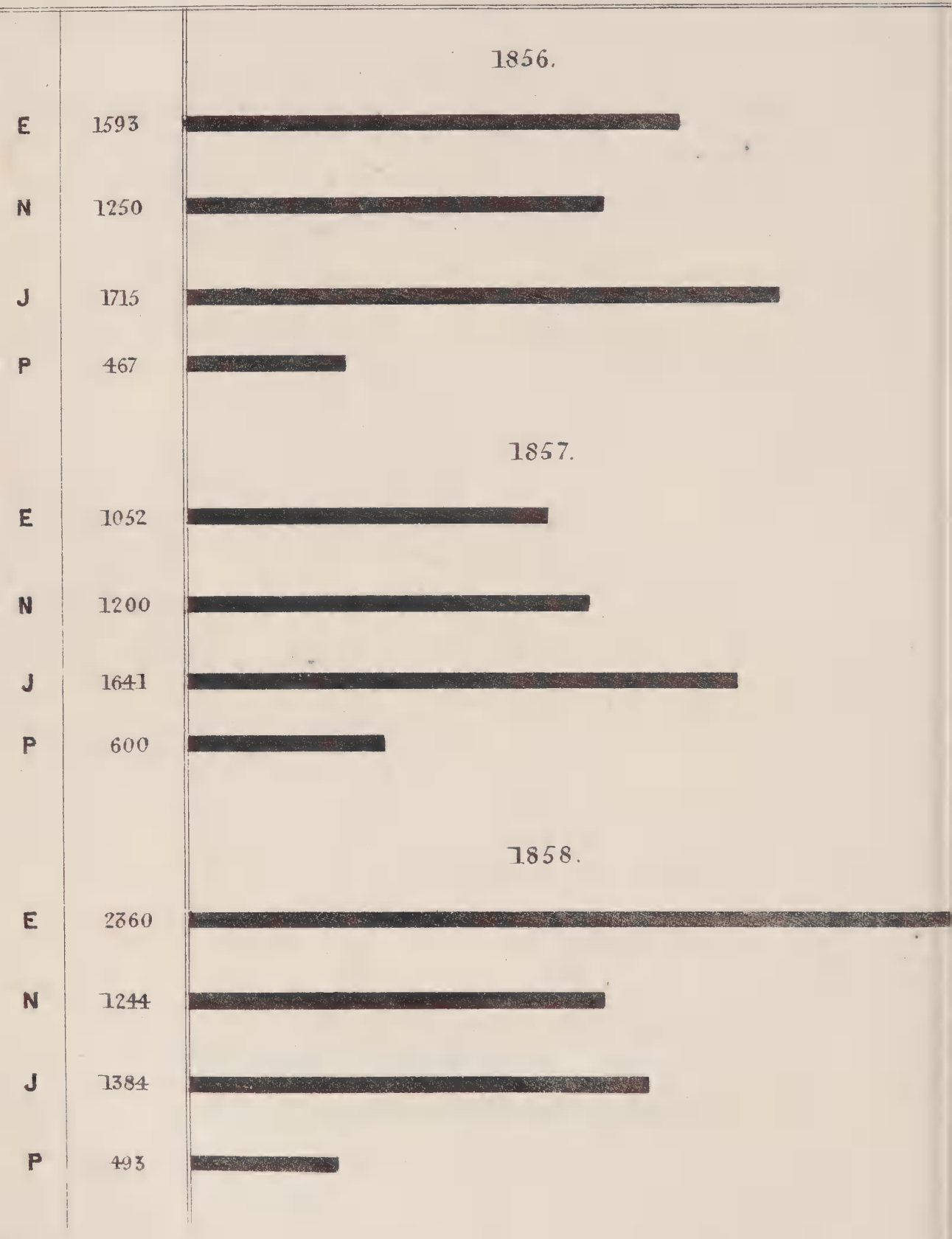

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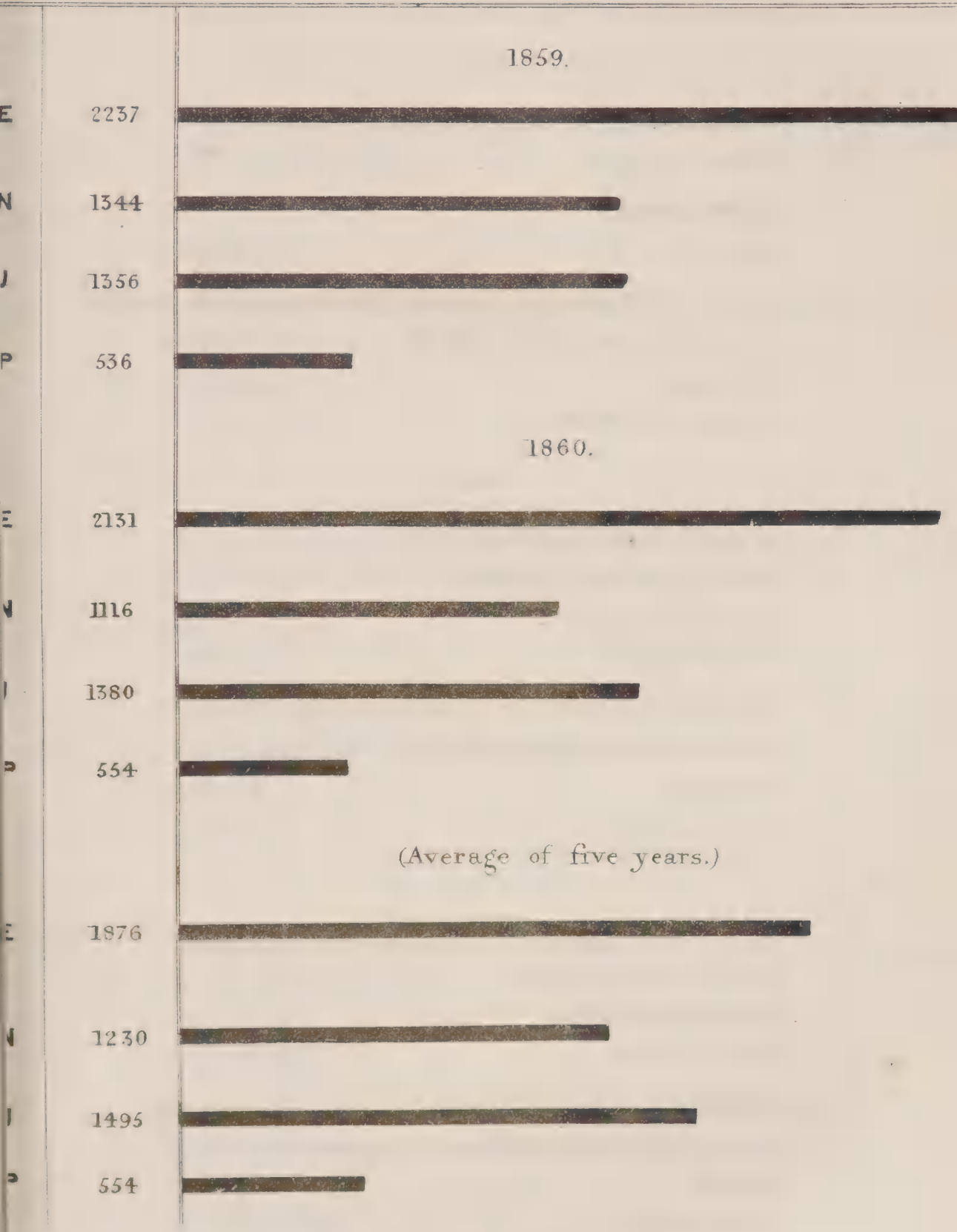
J. Prisoners in Jails

P. Police Force



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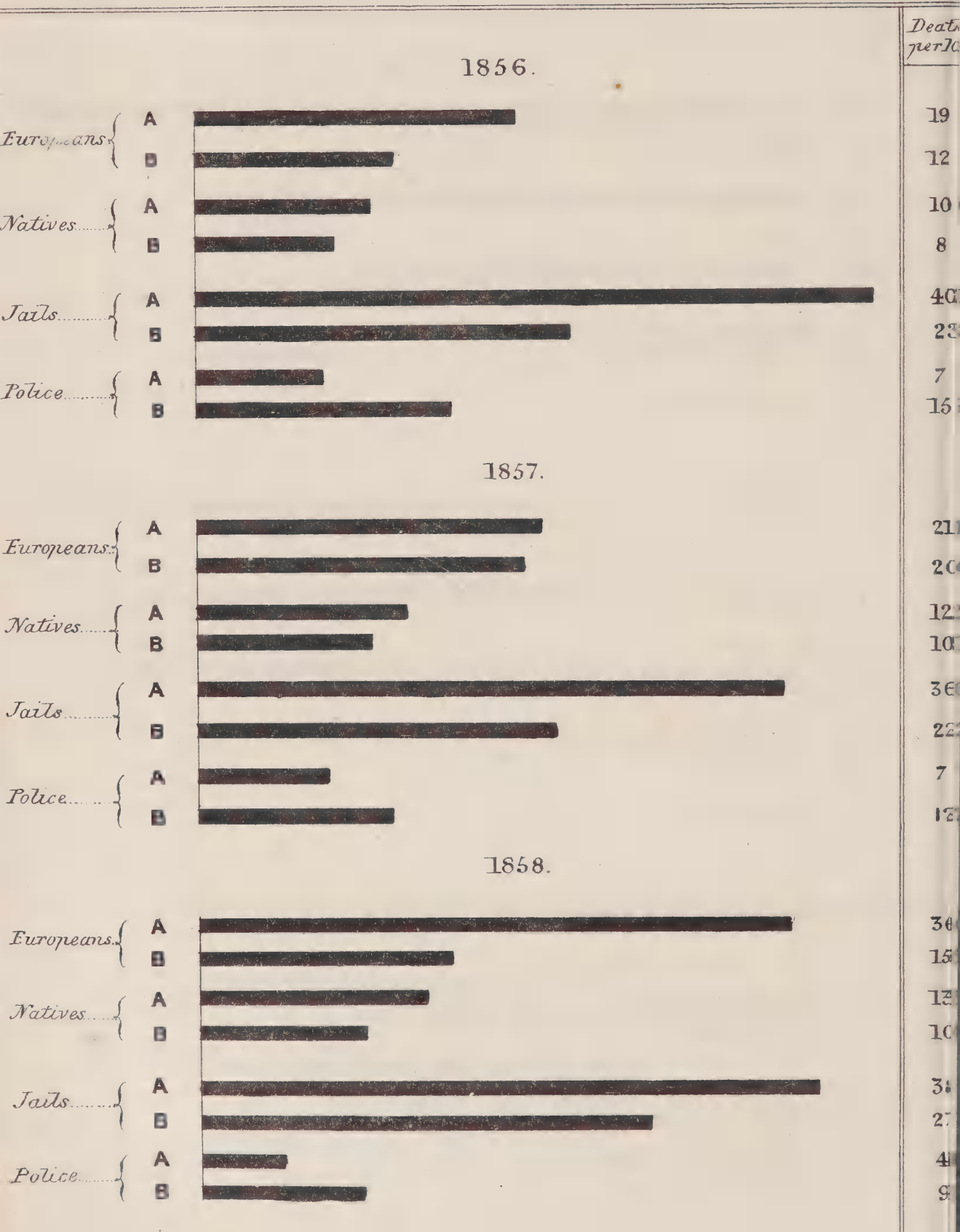

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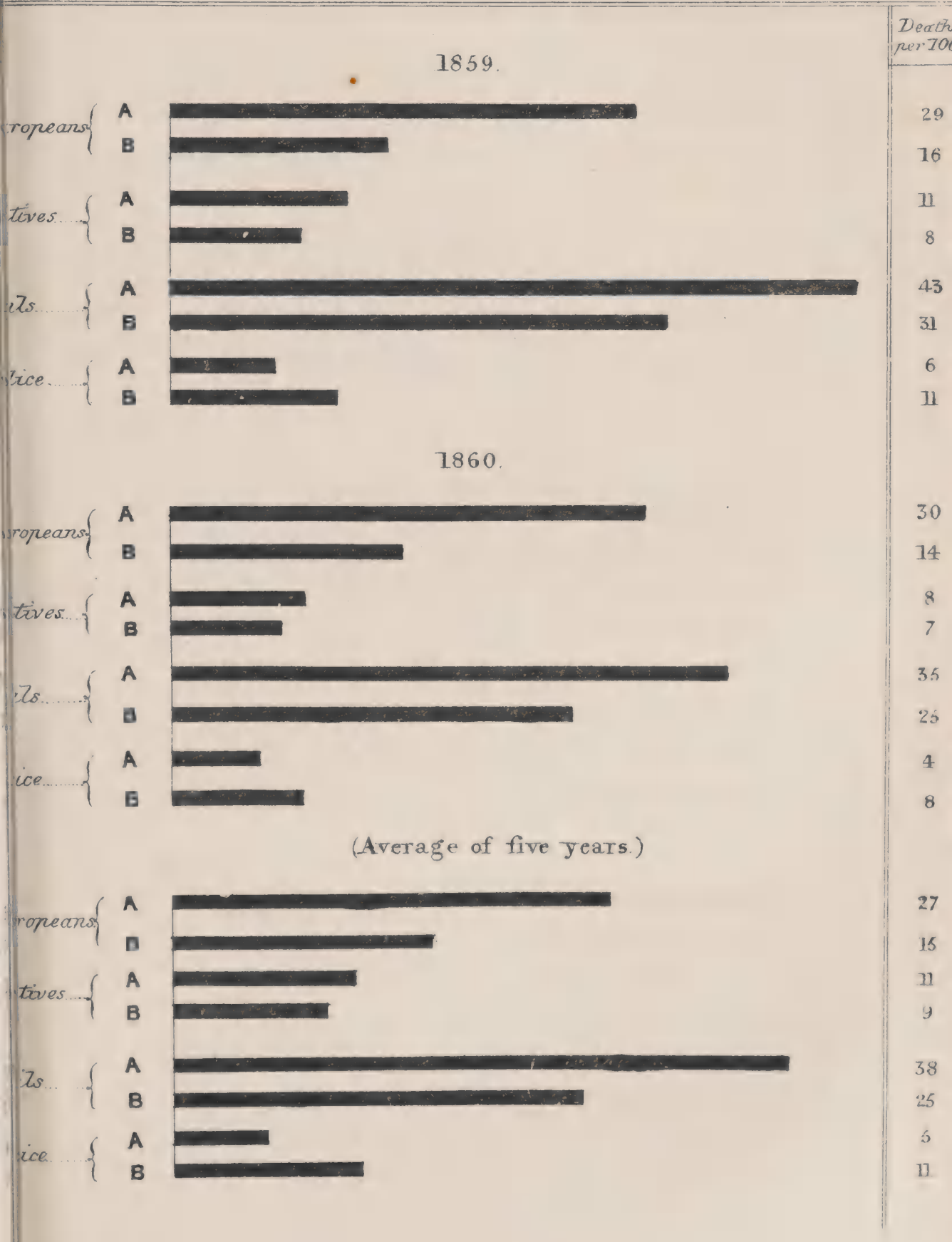

TABLES 1 to 8.

SICKNESS AND MORTALITY AMONGST EUROPEAN AND NATIVE TROOPS, &c.

No. 1.

SICKNESS AND MORTALITY amongst EUROPEAN TROOPS from 1856 to 1860 in the Bombay Presidency.

		DIVISIONS.										
		Presidency.	Poona.	Northern.	Southern.	Sind.	Rajpootana and Mhow.	Aden.	Persian Gulf.	Central India.	Oude and Bengal.	Total.
Strength.	1856	659	2,624	915	853	1,727	94	559	2,769	....	....	10,200
	1857	4,936	4,533	2,409	1,898	4,718	2,381	175	1,016	1,634	1,700	25,400
	1858	1,166	4,628	1,659	2,277	2,127	2,967	328	.....	4,858	1,482	21,492
	1859	793	4,266	2,009	969	2,149	5,499	469	....	....	....	16,154
	1860	658	3,474	1,632	1,225	2,448	3,917	461	....	....	....	13,815
Total..		8,212	19,525	8,624	7,222	13,169	14,858	1,992	3,785	6,492	3,182	87,061
Remained.	1856	90	231	45	72	183	1	25	....	....	....	647
	1857	46	143	48	14	71	....	16	113	....	....	451
	1858	95	261	66	152	214	176	8	....	202	72	1,246
	1859	128	398	156	146	153	500	10	....	....	....	1,491
	1860	97	326	90	79	220	299	26	....	....	....	1,137
Total..		456	1,359	405	463	841	976	85	113	202	72	4,972

Admitted.	1856	1,776	3,963	1,339	1,257	3,812	130	638	2,695	....	....	15,610
	1857	1,591	4,994	2,318	2,604	6,682	1,926	244	832	1,043	4,044	26,278
	1858	3,279	10,017	4,409	3,877	5,147	6,462	499	....	12,746	3,109	49,545
	1859	1,164	10,053	4,847	1,569	4,202	12,633	190	....	....	....	34,658
	1860	2,070	8,112	3,809	2,344	3,462	7,529	989	....	....	....	28,315
	Total..	9,880	37,139	16,722	11,651	23,305	28,680	2,560	3,527	13,789	7,153	1,54,406
Treated.	1856	1,866	4,194	1,384	1,329	3,995	131	663	2,695	....	....	16,257
	1857	1,637	5,137	2,366	2,618	6,753	1,926	260	945	1,043	4,044	26,729
	1858	3,374	10,278	4,475	4,029	5,361	6,638	507	....	12,948	3,181	50,791
	1859	1,292	10,451	5,003	1,715	4,355	13,133	200	....	....	....	36,149
	1860	2,167	8,438	3,899	2,423	3,682	7,828	1,015	....	....	....	29,452
	Total..	10,336	38,498	17,127	12,114	24,146	29,656	2,645	3,640	13,991	7,225	1,59,378
Died.	1856	39	37	18	18	50	1	2	29	....	....	194
	1857	33	58	20	18	71	34	3	1	13	296	547
	1858	43	64	56	47	69	155	8	....	277	57	776
	1859	36	172	62	20	36	156	....	....	....	....	482
	1860	45	82	101	12	58	119	8	....	....	....	425
	Total..	196	413	257	115	284	465	21	30	290	353	2,424
Remaining.	1856	46	143	48	14	65	....	16	113	....	....	445
	1857	95	254	66	161	218	176	8	....	196	72	1,246
	1858	128	398	156	146	110	214	10	....	386	43	1,591
	1859	49	290	90	66	153	326	27	....	....	....	1,001
	1860	59	196	38	84	106	240	47	....	....	....	770
	Total..	377	1,281	398	471	652	956	108	113	582	115	5,053

Percentage of Sickness and Mortality as shown in the preceding Table.

		P.	P.	N.	S.	S.	R. & M.	A.	P. G.	C. I.	O. & B.	Total.
Treated to Strength.	1856	283·1	159·8	151·2	155·8	231·3	139·4	118·6	97·3	..	....	159·3
	1857	33·1	113·3	98·2	137·9	143·1	80·8	148·5	93·0	63·8	237·8	105·2
	1858	289·3	222·0	269·7	176·9	252·0	223·7	154·5	..	266·5	214·6	236·3
	1859	162·9	244·9	249·0	176·9	202·6	238·8	42·6	..	..	....	223·7
	1860	329·3	242·8	238·9	197·7	250·4	199·8	220·1	..	..	....	213·1
Average..		219·5	196·5	201·4	169·0	216·0	176·5	136·8	95·1	160·1	226·2	187·6
Deaths to Strength.	1856	5·9	1·4	1·9	2·1	2·9	1·0	0·3	1·0	..	....	1·9
	1857	0·6	1·2	0·8	0·9	1·5	1·4	1·7	0·09	0·7	17·4	2·1
	1858	3·6	1·3	3·3	2·0	3·2	5·2	2·4	..	5·7	3·8	3·6
	1859	4·5	4·0	3·0	2·0	1·6	2·8	..	..	..	....	2·9
	1860	6·8	2·3	6·1	0·9	2·3	3·0	1·7	..	..	....	3·0
Average..		4·3	2·0	3·0	1·6	2·3	1·7	1·2	0·5	3·2	10·6	2·7
Deaths to Treated.	1856	2·1	0·8	1·3	1·3	1·2	0·7	0·3	1·0	..	....	1.2
	1857	2·0	1·1	0·8	0·6	1·0	1·7	1·1	0·1	1·2	7·3	2.0
	1858	1·2	0·6	1·2	1·1	1·2	2·3	1·5	..	2·1	1·7	1·5
	1859	2·7	1·6	1·2	1·1	0·8	1·1	..	..	..	....	1·3
	1860	2·0	0.9	2·5	0·4	1·5	1·5	0·7	..	..	....	1·4
Average..		2·0	0·1	1·4	0·9	1·1	1·6	0·7	0·5	1·6	4·5	1·5

No. 2.

CAUSES OF DEATH amongst EUROPEAN TROOPS from 1856 to 1860, in the Bombay Presidency.

Classes of Disease.	Divisions.										Total.
	Presidency.	Poona.	Northern.	Southern.	Sind.	Rajpootana and Mhow.	Aden.	Persian Gulf.	Central India.	Oude and Bengal.	
Fevers	15	55	58	14	64	125	8	9	31	18	397
Eruptive Fevers	1	5	1	2	..	10	..	..	8	2	29
Diseases of the Lungs.	30	40	19	9	36	28	3	3	14	9	191
,, Liver .	34	37	20	15	42	58	..	3	24	6	239
,, Stomach and Bowels	56	92	40	42	75	100	2	6	65	69	547
Epidemic Cholera ..	20	83	64	1	10	29	..	..	8	127	342
Diseases of the Brain .	13	40	45	10	31	66	2	1	85	30	323
Dropsies	13	13	1	1	3	4	2	1	1	1	40
Rheumatic affections..	2	2	..	..	1	3	..	..	1	1	10
Venereal ditto ..	4	1	2	1	3	1	..	..	1	....	13
Abscesses and Ulcers .	..	2	1	..	1	1	..	..	..	....	5
Wounds and injuries .	4	6	..	5	2	17	2	7	42	76	161
Diseases of the skin..	..	1	..	..	..	....	..	..	..	....	1
Other diseases	4	36	6	15	16	23	2	..	10	14	126
Total....	196	413	257	115	284	465	21	30	290	353	2,424

No. 3.

SICKNESS AND MORTALITY amongst NATIVE TROOPS from 1856 to 1860, in the Bombay Presidency.

		Divisions.									Total.
		Presidency.	Poona.	Northern.	Southern.	Sind.	Rajpootana and Mhow.	Aden.	Persian Gulf.	Central India.	
Strength.	1856	4,059	6,900	6,762	3,942	5,116	3,177	1,014	4,373	....	35,343
	1857	3,486	10,121	6,236	5,586	5,012	2,379	1,041	4,198	526	38,585
	1858	3,099	9,931	6,138	5,474	4,926	3,702	1,196	....	6,123	40,589
	1859	2,434	10,866	6,133	5,166	6,645	5,525	1,114	....	....	37,883
	1860	2,182	9,374	5,968	4,753	5,482	4,899	1,038	....	....	33,696
	Total.	15,260	47,192	31,237	24,921	27,181	19,682	5,403	8571	6,649	1,86,096
Remained.	1856	233	209	271	88	245	85	42	....	....	1,173
	1857	273	212	238	131	206	21	29	255	....	1,365
	1858	146	378	289	174	170	215	28	....	83	1,483
	1859	179	305	287	138	230	485	25	....	....	1,649
	1860	141	364	222	225	183	183	29	....	....	1,347
	Total.	972	1,468	1,307	756	1,034	989	153	255	83	7,017

Admitted.	1856	7,232	5,858	8,548	2,336	11,458	3,469	1,058	2,897	....	42,856
	1857	5,002	10,448	8,063	4,144	9,226	2,881	1,098	3,516	557	44,935
	1858	4,555	8,242	9,260	4,718	6,204	5,706	851	....	9,483	49,019
	1859	4,861	10,393	9,283	6,372	7,663	10,126	597	....	....	49,295
	1860	3,522	7,533	7,932	5,069	6,407	5,122	699	....	....	36,234
	Total..	25,172	42,474	43,086	22,639	40,958	27,304	4,303	6,413	10,040	2,22,389
Treated.	1856	7,465	6,067	8,819	2,424	11,703	3,554	1,100	2,897	....	44,029
	1857	5,275	10,660	8,301	4,275	9,432	2,902	1,127	3,771	557	46,300
	1858	4,701	8,620	9,549	4,892	6,374	5,921	879	....	9,566	50,502
	1859	5,040	10,698	9,570	6,510	7,893	10,611	622	....	...	50,944
	1860	3,663	7,897	8,154	5,294	6,590	5,305	728	....	....	37,631
	Total..	26,144	43,942	44,393	23,395	41,992	28,293	4,456	6,668	10,123	2,29,406
Died.	1856	101	62	68	15	73	16	12	27	....	374
	1857	70	138	73	38	78	25	15	56	4	497
	1858	62	77	85	40	39	32	91	....	129	555
	1859	51	99	83	78	67	53	10	....	....	441
	1860	34	57	80	37	44	39	4	....	....	295
	Total..	318	433	389	208	301	165	132	83	133	2,162
Remaining	1856	293	222	249	79	206	41	29	246	....	1,365
	1857	135	389	320	159	170	205	28	....	77	1,483
	1858	179	305	287	138	230	165	25	.....	320	1,649
	1859	112	394	238	191	166	155	29	....	....	1,285
	1860	128	221	204	105	62	70	19	....	....	809
	Total...	847	1,531	1,298	672	834	636	130	246	397	6,591

Percentage of Sickness and Mortality as shown in the preceding Table.

		P.	P.	N.	S.	S.	R. & M.	A.	P. G.	C. I.	Total.
Treated to Strength.	1856	183·9	87·9	130·4	61·4	228·7	111·8	108·4	66·2	....	124·5
	1857	151·3	105·3	133·1	76·5	188·1	121·9	108·2	89·8	105·8	119·9
	1858	151·3	86·7	155·5	89·3	129·3	159·9	73·4	..	156·2	124·4
	1859	207·0	98·4	156·0	126·0	118·7	192·0	55·8	..	....	134·4
	1860	167·8	84·2	136·6	111·3	120·2	108·2	70·1	..	....	111·6
	Average..	172.2	92·5	142·3	92·9	157·0	138·7	83·2	78·0	131·0	123·0
Deaths to Strength.	1856	2·4	0·9	1·0	0·3	1·4	0·5	1·1	0·6	....	1·0
	1857	2 0	1·3	1·1	0·6	1·5	1·0	1·4	1·3	0·7	1·2
	1858	2·0	0·7	1·3	0 7	0·7	0·8	7·6	..	2·1	1·3
	1859	2·0	0 9	1·3	1·5	1·0	0·9	0·8	..	....	1·1
	1860	1·5	0·6	1·3	0·7	0·8	0·8	0·3	..	....	0·8
	Average..	2·0	0·9	1·2	0·7	1·1	0.8	2·2	0·9	1·4	1·1
Deaths to Treated.	1856	1·3	1.0	0·7	0·6	0·6	0·4	1·0	0·9	....	0·8
	1857	1·3	1.2	0·8	0·8	0·8	0·8	1·3	1·4	0·7	1·0
	1858	1·3	0·8	0·8	0·8	0·6	0·5	10·3	..	1·3	1·0
	1859	1·0	0·9	0·8	1·1	0·8	0·5	1·6	..	....	0·8
	1860	0·9	0.7	0·9	0·6	0·6	0·7	0·5	..	....	0·7
	Average..	1·1	0·9	0·8	0.8	0·7	0·6	2·9	1·1	1·0	0·9

No. 4.

CAUSES OF DEATH amongst NATIVE TROOPS from 1856 to 1860, in the Bombay Presidency.

Classes of Disease.	DIVISIONS.									Total.
	Presidency.	Poona.	Northern.	Southern.	Sind.	Rajpootana and Mhow.	Aden.	Persian Gulf.	Central India.	
Fevers	84	122	124	50	117	42	11	27	34	611
Eruptive Fevers	4	7	5	3	1	1	..	1	2	24
Diseases of the Lungs	49	58	43	20	59	26	9	14	9	287
,, Liver	12	15	9	8	7	5	6	3	3	68
,, Stomach and Bowels	45	50	51	28	46	24	8	15	13	280
Epidemic Cholera	36	68	82	54	3	19	76	..	1	339
Diseases of the Brain	6	17	14	12	11	9	..	5	2	76
Dropsies	5	14	5	4	5	2	4	..	1	40
Rheumatic affections	14	8	6	4	13	1	5	3	1	55
Venereal affections	5	8	6	1	4	5	..	..	4	33
Abscesses and Ulcers	4	5	7	4	5	1	1	1	1	29
Wounds and Injuries	....	16	8	1	9	17	2	7	51	111
Diseases of Eye	1	..	....	....	..	....	..	..	....	1
,, of the Skin	2	..	1	....	..	....	..	..	....	3
Other diseases	51	45	28	19	21	13	10	7	11	205
Total	318	433	389	208	301	165	132	83	133	2,162

No. 5.

SICKNESS AND MORTALITY amongst PRISONERS IN JAILS from 1856 to 1861, in the Bombay Presidency.

Years.		Divisions.						Total.
		Presidency.	Poona.	Northern.	Southern.	Sind.	Aden.	
Strength..	1856	954	1,307	861	1,373	1,717	154	6,366
	1857	971	1,336	964	1,371	1,487	152	6,281
	1858	10,63	1,509	967	1,400	1,485	158	6,582
	1859	1,017	1,472	872	948	1,568	164	6,041
	1860	1,010	1,497	828	806	1,739	171	6,051
	Total..	5,015	7,121	4,492	5,898	7,996	799	31,321
Remained..	1856	19	59	83	68	142	8	379
	1857	24	72	39	60	106	5	306
	1858	21	50	65	57	79	4	276
	1859	36	74	48	42	78	3	281
	1860	36	66	43	32	51	5	233
	Total..	136	321	278	259	456	25	1,475

Admitted..	1856	806	2,089	1,711	2,014	3,805	114	10,539
	1857	1,219	2,039	2,114	1,756	2,759	115	10,002
	1858	1,237	1,933	1,788	1,636	2,042	199	8,835
	1859	1,015	1,774	1,651	1,023	2,325	124	7,912
	1860	1,385	2,041	1,415	862	2,259	161	8,123
	Total..	5,662	9,876	8,679	7,291	13,190	713	45,411
Treated..	1856	825	2,148	1,794	2,082	3,947	122	10,918
	1857	1,243	2,111	2,153	1,816	2,865	120	10,308
	1858	1,258	1,983	1,853	1,693	2,121	203	9,111
	1859	1,051	1,848	1,699	1,065	2,403	127	8,193
	1860	1,421	2,107	1,458	894	2,310	166	8,356
	Total..	5,798	10,197	8,957	7,550	13,646	738	46,886
Died..	1856	18	51	36	29	120	5	259
	1857	24	45	47	48	59	6	229
	1858	26	70	62	35	58	3	254
	1859	28	64	68	49	49	1	259
	1860	85	31	43	12	41	5	217
	Total..	181	261	256	173	327	20	1,218
Remaining..	1856	24	72	39	60	106	5	306
	1857	21	50	65	57	79	4	276
	1858	36	74	48	42	78	3	281
	1859	36	66	43	32	51	5	233
	1860	24	59	34	22	81	6	226
	Total..	141	321	229	213	395	23	1,322

Percentage of Sickness and Mortality as shown in the preceding Table.

		P.	P.	N.	S.	S.	A.	Total.
Treated to Strength.	1856	86·4	164·3	208·3	151·6	229·8	79·2	171·5
	1857	128·0	158·0	223·3	132·4	192·6	78·9	164·1
	1858	118·3	131·4	191·6	120·9	142·8	128·4	138·4
	1859	103·3	125·5	194·8	112·3	153·2	77·4	135·6
	1860	140·6	140·7	176·0	110·9	132·8	97·0	138·0
	Average..	115·3	143·9	198·8	125·6	170·2	92·1	149·5
Deaths to Strength.	1856	1·8	3·9	4·1	2·1	6·9	3·2	4·0
	1857	2·4	3·3	4·8	3·5	3·9	3·9	3·6
	1858	2·4	4·6	6·4	2·5	3·1	1·8	3·8
	1859	2·7	4·3	7·7	5 1	3·1	0 6	4·3
	1860	8·4	2·1	5·2	1·4	2·3	2·9	3·5
	Average..	3·5	3·6	5·6	2·9	3·8	2·4	3·8
Deaths to Treated.	1856	2·1	2·3	2·0	1·3	3·0	4·0	2·3
	1857	1·9	2·1	2·1	2·6	2·0	5·0	2·2
	1858	2·0	3·5	3·3	2 0	2·7	1·4	2·7
	1859	2·6	3·4	4·0	4·6	2 0	0·7	3·1
	1860	5·9	1·4	2·9	1·3	1·7	3·0	2·5
	Average..	2·9	2·5	2·8	2·3	2·2	2·8	2·5

No. 6.

CAUSES OF DEATH amongst PRISONERS IN JAILS, from 1856 to 1860, in the Bombay Presidency.

Classes of Disease.	Divisions.						Total.
	Presidency.	Poona.	Northern.	Southern.	Sind.	Aden.	
Fevers	17	59	30	22	43	4	175
Eruptive Fevers	1	1	....	....	....	1	3
Diseases of the Lungs	10	26	13	6	81	2	138
„ Liver	2	7	1	....	6	....	16
„ Stomach and Bowels	40	55	63	54	92	1	305
Epidemic Cholera	62	27	50	36	7	....	182
Diseases of the Brain	5	9	....	1	8	1	24
Dropsies	5	9	3	4	8	3	32
Rheumatic affections	2	5	....	5	4	....	16
Venereal affections	1	2	....	1	2	....	6
Abscesses and Ulcers	4	1	....	....	6	.....	11
Wounds and Injuries	....	5	3	2	2	....	12
Diseases of the Eye	....	....	2	....	....	....	2
„ Skin	1	4	....	2	....	....	7
Other diseases	31	51	91	40	68	8	289
Total	181	261	256	173	327	20	1,218

No. 7.

SICKNESS AND MORTALITY amongst the POLICE FORCE, from 1856 to 1860, in the Bombay Presidency.

		Divisions.						Total.
		Presidency.	Poona.	Northern.	Southern.	Sind.	Aden.	
Strength..	1856	1,872	1,725	2,408	1,945	3,382	....	11,332
	1857	2,249	1,955	3,386	3,561	4,901	165	16,217
	1858	2,721	3,279	4,107	3,865	4,324	167	18,463
	1859	2,331	3,408	6,158	3,017	4,838	185	19,937
	1860	2,678	3,455	5,906	2,453	4,919	218	19,629
	Total..	11,851	13,822	21,965	14,841	22,364	735	85,578
Remained..	1856	13	43	41	35	50	....	182
	1857	22	12	27	64	56	....	181
	1858	21	23	52	72	125	4	297
	1859	23	61	107	65	116	1	373
	1860	7	53	158	100	72	8	398
	Total..	86	192	385	336	419	13	1,431

Admitted..	1856	792	637	947	800	1,943	....	5,119
	1857	1,045	673	2,315	1,783	3,666	57	9,539
	1858	895	950	2,456	1,460	2,964	84	8,809
	1859	750	1,315	4,611	1,424	2,100	118	10,318
	1860	1,011	1,155	4,799	902	2,469	156	10,492
	Total..	4,493	4,730	15,128	6,369	13,142	415	44,277
Treated..	1856	805	680	988	835	1,993	....	5,301
	1857	1,067	685	2,342	1,847	3,722	57	9,720
	1858	916	973	2,508	1,532	3,089	88	9,106
	1859	773	1,376	4,718	1,489	2,216	119	10,691
	1860	1,018	1,208	4,957	1,002	2,541	164	10,890
	Total..	4,579	4,922	15,513	6,705	13,561	428	45,708
Died..	1856	11	8	28	3	33	....	83
	1857	16	12	17	20	53	....	118
	1858	14	16	20	9	24	1	84
	1859	16	16	40	18	30	2	122
	1860	8	10	38	3	32	1	92
	Total..	65	62	143	53	172	4	499
Remaining..	1856	22	12	27	64	56	....	181
	1857	21	23	52	72	125	4	297
	1858	23	61	107	65	116	1	373
	1859	7	53	158	100	72	8	398
	1860	14	50	94	16	59	1	234
	Total..	87	199	438	317	428	14	1,483

Percentage of Sickness and Mortality as shown in the preceding Table.

		P.	P.	N.	S.	S.	A.	Total.
Treated to Strength.	1856	43·0	39·4	41·0	42·9	58·8	....	56·7
	1857	47·4	35·0	69·6	51·8	75·9	34·5	49 9
	1858	33·6	29·6	61·0	39·6	71·4	52·6	49·3
	1859	33·1	40·3	76·6	49·3	45·8	64·3	53·6
	1860	38·0	34·9	84·0	40·8	51·6	75·2	55·4
	Average..	39·0	35·8	66·4	44·8	60·7	56·6	53·0
Deaths to Strength.	1856	0·5	0·4	1·1	0·1	0·9	....	0·7
	1857	0·7	0·6	0·5	0·5	1·0	....	0·7
	1858	0·5	0·4	0·4	0·2	0·5	0·5	0·4
	1859	0·6	0·4	0·6	0·5	0·6	1·0	0·6
	1860	0·2	0·2	0·6	0·1	0·6	0·4	0·4
	Average..	0·5	0·4	0·6	0·3	0·7	0·3	0·5
Deaths to Treated.	1856	1·3	1·1	2·8	0·3	1·6	....	1·5
	1857	1·4	1·7	0·7	1·0	1·4	....	1·2
	1858	1·5	1·6	0·8	0·5	0·7	1·1	0·9
	1859	2·0	1·1	0·8	1·2	1·3	1·6	1·1
	1860	0·7	0·8	0·7	0·3	1·2	0·6	0·8
	Average..	1·3	1·2	1·1	0·6	1·2	0·6	1·1

No. 8.

CAUSES OF DEATH amongst the POLICE FORCE, from 1856 to 1860, in the Bombay Presidency.

Classes of Disease.	Divisions.						Total.
	Presidency.	Poona.	Northern.	Southern.	Sind.	Aden.	
Fevers	25	27	29	16	51	1	149
Eruptive Fevers	1	....	2	3	3	....	9
Diseases of the Lungs	5	10	28	4	49	....	96
„ Liver	4	2	4	....	1	1	12
„ Stomach and Bowels	10	7	17	8	22	1	65
Epidemic Cholera	9	7	36	17	6	....	75
Diseases of the Brain	....	1	6	2	4	....	13
Dropsies	....	1	2	1	6	....	10
Rheumatic affections	1	....	....	....	1	....	2
Venereal ditto	....	1	....	1	3	....	5
Abscesses and Ulcers	2	1	1	....	2	....	6
Wounds and Injuries	....	1	3	....	5	1	10
Other diseases	8	4	15	1	19	....	47
Total	65	62	143	53	172	4	499

THE RELATION OF DYSENTERY TO ABSCESS OF THE LIVER, AS SHOWN BY THE CLINICAL RECORDS OF THE EUROPEAN GENERAL HOSPITAL, BOMBAY.

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Presented December 1862.

The numerous cases in which Abscess of the Liver and Dysentery are concomitant induced Annesley [1] to go so far as to make a distinction between what he designated "Simple Dysentery," and "Hepatic Dysentery." Since Annesley's time, all authors, I believe, with two exceptions only, namely, Drs. Henoch [2] and Morehead, [3] have inclined to the opinion that the intimate connection of cause and effect exists between these two forms of disease. Thus Parkes, [4] Martin, [5] Machpherson, [6] Macnamara; [7] the French authorities, as Pascal in Algeria; and even pathologists in Europe, as Budd, [8] Andral, [9] Abercrombie, [10] and Cheyne, [11] have all noticed the occurrence of Hepatic abscess, *or other disease of the liver*, during the progress of Dysentery.

The plausible theory brought before the profession a few years

1 Annesley's Diseases of India, p. 485.
2 Henoch on Dysentery and Abscess of the Liver, British and Foreign Med. Ch. Review, 1846.
3 Morehead's Researches, Vol. II. p. 10.
4 Parkes, Remarks on Dysentery and Hepatitis in India, 1846.
5 Martin's Influence of Tropical Climates, p. 226.
6 Machpherson, Indian Annals Medical Science, Vol. VI.
7 Macnamara, Ibid, Vol. XV. On the Pathology of Hep. Abscess.
8 Budd on Diseases of the Liver, p. 62.
9 Andral, Medical Clinique Obs. p. 25.
10 Abercrombie, Diseases of the Stomach, p. 266.
11 Cheyne, Dublin Hospital Reports, Vol. III.

since by Dr. Budd, [1] that hepatic abscess in dysentery was occasioned by absorption, or by conveyance of pus by a vein, communicating with an ulcer in the intestines; or by inflammation in such vein; or by deterioration of the (portal) blood (especially)—in short by pyæmia—has done much to confirm the opinion, that dysenteric inflammation is the usual cause of abscess in the liver.

Notwithstanding the evidence of so many authorities, and admitting the occasional truth of Dr. Budd's theory, it would appear that the intimate connexion of cause and effect, supposed to exist between these two forms of disease, cannot be so general, as many have presumed. As evidence of the truth of this remark, it will be demonstrated that the two diseases themselves are not so very frequently found in the same individual as has been previously reported.

That such is not the case in Europe is admitted on all hands, otherwise Dr. Baly's evidence regarding dysentery as it occurred in an epidemic form, in the Milbank Penitentiary, might be adduced. [2] In semi-tropical climates we have the recent testimony of Dr. Marston, who states that out of a great number of soldiers who came under his care in the Malta Hospital, for different forms of dysentery, contracted in the Crimea, only *two* were the subjects of liver disease.[3]

Amongst the patients in the European General Hospital, Calcutta, Dr. Machpherson [4] found out of 160 cases of dysentery the liver "altered in 84"; and this has been quoted as an argument in favour of the frequent sequence of abscess of the liver on dysentery, [5] yet Dr. Machpherson himself states that abscess was only found in 21 cases, or about 13 per cent. !

Again, in 157 cases noticed by French Surgeons in Algeria,

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1 Budd on Diseases of the Liver, p. 62.

2 Lancet, December 1851. Indian Annals Medical Science, Vol. XV.

3 Medical Times, 1856.

4 Indian Annals Medical Science, Vol. II.

5 Martin on Tropical Climates: Macnamara, Indian Annals Medical Science, Vol. XV.

65 livers were found diseased, in one manner or other; including [1] only 20 examples of abscess or 12·7 per cent.

The Principal Inspector General's "Statistics of more "important diseases admitted into the European General Hospital "during 10 years," show 129 cases of dysentery, among which the liver was diseased in 71; but only 25 or upwards of 19 per cent. were affected with abscess. [2]

Dr. Leith's reports of the same institution give 92 cases, with 14 of abscess, and during one year, 1859, in 47 cases of dysentery, there were only 4 instances of abscess observed, giving the still smaller ratio of 8 per cent. [3]

In 196 well recorded cases of dysentery in the European General Hospital, I find 35 or 17 per cent. were affected with abscess; but nearly one-third, or 30·6 per cent. were noticed to have had other affections of the organ as enlargement, cirrhosis, old chalk-like formations, &c.

Mr. Eyre reports 27 cases of abscess in 118 cases, but the liver was diseased in 49. [4]

Mr. Waring gives 633 instances of dysentery, with 149 of abscess. [5]

Some other observers have however recorded a much greater percentage of abscess. Thus Dr. Parkes [6] mentions 7 cases of abscess of the liver occurring in 25 cases of dysentery in Burmah. Marshall [7] gives the same ratio as occurring in Ceylon. Macnamara [8] gives in the Madras Presidency 26 cases in 51: and Dr. Morehead is frequently quoted as having observed 12 in 30. [9]

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1 Quoted by Martin, p. 262.
2 Bombay Med. Phys. Soc. Trans.
3 Op. cit. No. 10, New Series.
4 Indian Annals Medical Science, Vol. V.
5 Waring, Statistics and Pathology of Abscess of the Liver, p. 54.
6 Parkes' Remarks on Hepatitis and Dysentery in India.
7 Quoted by Martin, p. 227.
8 Indian Annals Medical Science, Vol. XV.
9 By Martin and Macnamara, Op. cit.

The following table exhibits the ratio of Abscess of the Liver to Dysentery, according to different observers.

Observer's Name.	Where observed.	No. of cases.	No. of cases in which disease of Liver was observed.	Proportion.	No. of cases in which Abscess was observed.	Proportion.
Machpherson .	European General Hospital Calcutta.	160	84	52·5	21	13·1
French Surgeons.	Algeria.....	157	65	41·4	20	12·7
Eyre.....	Madras Fusileers, &c.	118	49	41·6	27	22·8
Waring.....	Various localities.	633	Not stated ..	..	149	23·5
Stovell.....	European General Hospital Bombay.	129	71	55·0	25	19·3
Leith (one year).	Ditto	47	Not stated ..	..	4	8·5
Leith (several years).	Ditto	92	Ditto	..	14	15·2
Moore	Ditto	196	60	30·6	35	17·8
Parkes	Burmah	25	Not stated ..	..	7	28·8
Marshall	Ceylon.....	25	Ditto	..	7	28·8
Macnamara ..	Madras.....	51	Ditto	..	26	50·9
Morehead ...	Bombay	30	Ditto	..	12	40.0

If the first eight observers' figures are taken, it will be seen, that in 1,532 cases there were but 295 examples of abscess, or 18 per cent. If the last four only are considered, there is found to be 131 cases, with 52 instances of abscess, or approaching 40 per cent.

My own impression is, that the former is the correct ratio, and it would appear probable, that the cases referred to, by the latter authors, were not all instances of abscess of the liver, but, that like Dr. Machpherson's, and the French Series, *all diseased conditions* found in the organ, have been taken into the account.

Indeed, it would appear certain that hepatic abscess follow-

ing dysentery is *not* the rule, but that the liver disease when it does so occur, is mostly caused by the same excitants (as climate, cold, vicissitudes of temperature, &c.) promoting the dysentery. Otherwise we might expect abscess of the liver in every case of the former affection, and also during the progress of ulcerations of typhus, of phthisis, and of those following severe burns, which assuredly is not the case. Of course, in a tropical climate, the liver during dysentery, as in the progress of any other disease, or during health, is more disposed to become affected, than it is in a colder latitude, which possibly may alone account for the number of cases in which liver diseases and dysentery are co-existent.

It has been supposed by many authors, as Sir Ranald Martin [1] for instance, that an intimate connection exists, between inflammation or ulceration of the cœcum, and liver disease. This idea however, is not confirmed by the results of the *post mortems* I examined. In only 22 instances or in 11·2 per cent. of the whole number, is this part of the intestines, noted as particularly affected in connection with liver abscess, while the total of cases noticed as having the cœcum affected, is 72 or 36·7 per cent.

The other points of interest remarked in connection with these cases, were, that perforation is noted to have occurred in 23 instances (11·7 per cent.) ; and extension of the inflammation to the small intestines in 26, or 13· 2 per cent.

The following table exhibits these latter points.

No. of Post Mortems.	No. of cœcums recorded affected.	Proportion.	No. of cases of Liver Abscess and cœcal disease.	Proportion.	No. of cases of Perforation.	Proportion.	No. of cases of extension of inflammation to small intestines.	Proportion.
196	172	36·7	22	11·2	23	11·7	26	13·2

1 Martin on Tropical Climates, p. 228.

APPENDIX.

APPENDIX.

No. 1.

Notes of three fatal cases in which Fibrinous Coagula were found in the Heart.—By Dr. PEET, Surgeon to the Jamsetjee Jeejeebhoy Hospital, Bombay.

CASE 1.—Senoo Myam, age 25, Hindoo, Cart driver, Native of Janpoor in Northern India, lately arrived in Bombay, after a long journey, during which he was badly fed, was admitted into the Clinical Ward on the 5th February 1862. It was stated that his illness commenced ten days before; that it set in with cough, fever, and dyspnœa, without any apparent cause, and continued to increase up to the time of his admission. The cough was at first dry, but latterly he spat up a little adhesive mucus untinged. The dyspnœa throughout was very severe, and the fever more or less continuous.

When first seen the face was pinched, expressive of great suffering, and the alæ nasi in constant action. It was rather pale than livid, and was not swollen. He was somewhat incoherent, though capable of answering questions at times quite rationally. The skin of the trunk was above, that of the extremities rather below, the natural heat. There was great dyspnœa, the respirations were 48 in the minute. The chest at each inspiration seemed to be fairly expanded; there was no dulness; air was found to enter every part of the lung. Sibilant and subcrepitant rhonci were more or less general over both sides of the chest. The pulse was 120, small and ill-developed. He had a troublesome short cough, with adhesive expectoration, which was at no time tinged. On the night of the 5th he became delirious, and continued so during the whole of the 6th and night of the 7th, the dyspnœa being at the same time very severe. On the morning of the 7th the pulse was 130 and feeble, and the skin cold; the breathing greatly oppressed. He died at 10 o'clock.

Sectio-Cadaveris, 6 hours after death.—On opening the chest the lungs did not collapse, they were crepitating throughout. On section

a large quantity of thin frothy sanious fluid oozed out; the part was solidified. On opening the pericardium, the heart seemed large, its cavities were evidently distended; they were found to contain coagula of two kinds, some loose, partially decolorized, others quite white and firmly adherent to the walls; the latter were chiefly seen in the right side of the heart.

Case 2.—Nundee, age 30, Hindoo servant, was under treatment by Dr. Ballingall for syphilis. He was doing well, the sore having almost healed. On the evening of the 31st December 1861 he complained of cough; on the following morning the cough had increased, and the pulse became very small. During the day he was very restless, and had great dyspnœa; the cough continued, and he expectorated a little rusty-looking fluid; the pulse became imperceptible, and he died at half past one o'clock, having only been ill about twenty hours.

On examination after death a very small portion of one lung was solidified, either from pneumonia or pulmonary apoplexy. The heart contained decolorized coagula, firmly adherent to the walls of the ventricles.

Case 3.—Durya Khan, age 20, Mussulman, just arrived from Sind; admitted into the Clinical Ward on the 16th February 1862. He was unable to speak, so that no history could be obtained. There was great dyspnœa; the pulse was 120 and very feeble; the skin coldish; the face was expressive of much distress. He had a slight short cough, with opaque adhesive expectoration. The chest was but cursorily examined owing to his weak state; no dulness could be discovered. He died a few hours after admission.

Sectio-Cadaveris.—The body was not much emaciated. There were adhesions of the pleura on both sides; those on the right were easily broken down. Upon the visceral layer on this side there were flakes of recently effused lymph, and in the sac there were 2 or 3 ounces of turbid serum. The lungs did not collapse: a good deal of frothy fluid escaped on section. No part was hepatized; the whole of both lungs were freely crepitating. There were about 3 ounces of clear serum in the sac of the pericardium. In the right ventricle there was a coagulum decolorized, and firmly adherent to the wall, and also to the margin of

the auriculo-ventricular opening and tricuspid valve. It reached through this opening into the auricle, and was so firmly attached to the auricular wall that the heart could be lifted by it. That portion within the auricle was completely discoloured, and when divided presented an uniform appearance throughout. There was neither coloured fluid nor purulent matter in the centre. The left side of the heart contained loose coagula not discoloured, and not adherent.

Remarks.—These are, I think, cases in which death was due to the formation of coagula in the heart. The symptoms, viz: the great dyspnœa, cold extremities and feeble pulse, were clearly referrible to an embarrassed state of the circulation. The lungs after death were found to be pervious to air in almost every part, from which it may be inferred that there was no obstacle to the due performance of the respiratory functions so far as they were concerned. The dyspnœa was probably due to the want of sufficient blood. That the coagula were formed before death seems certain from their firm adhesion to the walls, and the absence of coloured blood in the centre. In the first and last of the three cases described, the evidence is still stronger, as the left side of the heart contained ordinary loose coagula. If coagulation on the right side had occurred at the same time as that on the left, the coagula would doubtless have presented similar characters.

Two practical points in connection with Fibrinous Coagula in the heart may be briefly noticed—

1*st*.—Can their presence be detected during life?

2*nd*.—What is the cause of the coagulation?

1. The symptoms will vary according to the situation and amount of the coagula, but in a general way it may be said that intense dyspnœa, cold extremities, delirium, a feeble and intermitting pulse, and absence of the ordinary signs of apnœa, there being no impediment to the admission of air into the chest, denote the presence of coagula in the heart. It does not appear that they give rise to any murmur, but emphysema of the lungs is common, and of course the physical signs of its presence would be confirmatory.

2. As to the cause of the coagulation, there is much difference of opinion. Dr. Richardson states that it is due either to super-Fibrination

of the blood which is present in inflammatory diseases, or to languid motion of the blood current. More recent observations would seem to point to the presence of some foreign body in the blood, such as the products of inflammation, pus, &c. Emboli in the pulmonary and cerebral arteries have indeed been traced to vegetations from the valves of the heart.

No. 2.

Report of some experiments upon Dogs, made in connection with the subject of Dr. Haines' communication to the Society, printed at p. 224.

1.—To a stout dog, after previous fasting, three doses of pills and draught, of similar composition to those prescribed in the case referred to by Dr. Haines, were administered, at intervals also the same as in that case. No effects beyond what might be attributed to the local action of the ammonia were noticed, and next day the dog was killed.

Careful examination of the viscera disclosed a condition in all respects resembling that of health. The contents of the stomach were not submitted to analysis.

2.—A week after, to a small dog deprived of food for some hours and in a weakly state, a large dose (probably upwards of ten grains were swallowed) of calomel, washed down by repeated draughts containing much free carbonate of ammonia, was given about midday. Symptoms of abdominal uneasiness, occasional retching, but no purging, spasms and twitchings, appeared after a few hours, and in the course of the night the dog died.

On post-mortem examination no marks whatever of local irritation were discernible: the stomach contained a quantity of indigestible *débris*, portions of which were submitted to chemical analysis (with the kind assistance of Dr. Giraud), but no trace even of corrosive sublimate, or of a mercurial salt, was obtained.

The dog when experimented on was in an exhausted condition, and was not fed after the exhibition of the drugs.

3.—To a small dog, large doses of calomel and carbonate of ammonia in solution were administered, the latter being introduced with the stomach-pump; and most of the calomel must also have reached the stomach.

No effect having followed the first combined doses, they were repeated on the following day; temporary depression and abdominal uneasiness supervened, but soon after passed off, the animal regaining, to all appearance, its healthy state. As these experiments seemed conclusive, the dog was allowed to enjoy liberty again.

Remarks.—Perhaps the safest, if not the sole, conclusion that can be elicited from these few experiments, is that the circumstances under which the dangerous transformation of calomel occurs must be unusual, if not rare; and that generally, at least, the conditions under which the two remedies in question are administered are unfavourable to these chemical reactions which have been shown to take place, when no impediment to the play of chemical affinity is present. The drugs were given when it might be supposed that the stomach was empty, on account of the antagonizing influence the gastric juice might exert: but in the fatal case the stomach was found partly occupied; unfortunately the acid or alkaline condition of its contents was not ascertained, yet the presence of organic matters alone might be inimical to the operation of the poison, supposing it had been formed in the stomach.—H.V.C., *Secretary.*

No. 3.

Note on the peculiar Evacuations sometimes noticed in Epidemics of Cholera.—Extracted from the Annual Report of the Jamsetjee Jejeebhoy Hospital for the year 1862.

Paragraph 12. The cases of Cholera have been unusually severe; in 17 cases the stools were of a pink colour, and of these not one recovered. In 40 cases they were noticed as not being pink, in 43 the colour is not mentioned; probably some of these may have been pink.

16. The pink stools noticed in paragraph 12 are certainly not of common occurrence. Until within the last 3 years, I have seldom observed them. Dr. Morehead mentions having seen them occasionally, and only in the Jamsetjee Jejeebhoy Hospital: he gives 3 cases. So large a number as 16 cases in which the stools were of this character in a single epidemic, is I believe unprecedented. Dr. Morehead states that the pink colour is caused, no doubt, by partial transudation of the colouring matter of the blood. At my request Dr. Carter was good enough to examine the discharges, under the microscope, and has favoured me with the following report:

"*Microscopic examination of the pink coloured stools of a Cholera "patient, Jamsetjee Jejeebhoy Hospital, December 19th,* 1861.

"The consistence was like that of pea-soup, reaction neutral to test "paper; a portion of the brick-red opaque mucus was examined, and "in it were found much granular matter; many forms of vegetable "cells; epithelial cells, principally Columnar; oil globules; numerous "quaternate clusters of *sarcina ventriculi;* and several red blood cor- "puscles, generally aggregated, occasionally separate.

"To these last, as well probably to a more diffused stain from exuded "hœmatine, was the red colour of the stools apparently owing."

17. The mucous membrane of the small intestines was examined in several cases; where the stools had been pink, it was unusually red, and the solitary glands in a marked manner prominent.

18. There has not been any change in the treatment, which has been detailed on former occasions.—Dr. Peet, Surgeon to the Hospital.

No. 4.

Report of a Case of Suicide by hanging, attended with rupture of the Superior longitudinal sinus.—By Assistant Surgeon S. W. Lithgow.

Presented by the Principal Inspector General, Medical Department.

Thomas Stevenson, Gunner D Battery, 4th Brigade Royal Horse Artillery; Service in India 2 years; admitted 8th October 1862. Age about 24 years.

Admitted suffering from the effects of an attempt at suicide by hanging. He was confined at 5 P.M. to-day for being drunk, and in about 5 minutes afterwards was discovered in his cell hanging by a piece of jacket lace from a rafter. He was described as being "lifeless." Immediately afterwards when seen by Mr. Apothecary Kinlock, he was breathing stertorously, pulse was small and weak, pupils dilated, face and lips livid. He had him removed to Hospital, where I saw him immediately afterwards; he was there lying on his back, and with the exception of the movements of respiration, quite motionless; breathing was stertorous, hurried, chiefly abdominal and accompanied by a peculiar

rattle in the throat ; eyes fixed, pupils widely dilated and insensible to the stimulus of light. Both sensation and voluntary motion in abeyance. Imperfect oxidation of the blood denoted by blueness and lividity of the skin and lips ; pulse small, fluttering and intermittent. Mark of cord above larynx narrow, raised and excoriated. The stomach pump had been introduced by Mr. Kinlock before my arrival, and a quantity of fluid smelling strongly of beer and arrack evacuated. Before its removal spirits ammonia aromatic ʒss., mixed with some water, was injected. He was then taken out into the verandah on the cot, and a stream of cold water made to fall from a height, on the vertex, the head and the shoulders at the same time kept well raised. An enema, containing ol. tiglii m. iv. was administered, and the feet and legs bathed with hot water, in which mustard had been thrown ; shortly afterwards vomiting took place, simultaneously with the evacuation of the bowels. This was followed by slight appearance of amendment ; great dyspnœa was present, and was characterised by alternate remissions and exacerbations. At times the respiration seemed to be suspended, but the application of the douche to the chest always called forth a deep inspiration ; this was repeated as often as the respiration appeared to flag. The enema having only produced two stools, it was repeated after a time, likewise two minims of croton oil administered by the mouth, the power of deglutition having returned temporarily ; by 7 P.M. he could move his arms up to his chest, pupils were observed to contract slightly on application of light, and his lips and face had a more natural colour. This was followed by drawing up the legs and attempts at groaning ; on the addition of more hot water being made to the foot-bath, pulse rose, increased in strength and kept intermitting every third beat. This was succeeded by a period of relapses and retrogressions of the favourable symptoms. The cold douche was again assiduously applied continuously to the head and occasionally to the chest, when the respiration appeared to fail ; gradual improvements were apparent, so that by 9 P.M. he had assumed a more natural position on his side ; pupils contracted distinctly on a lighted candle being put before them, and eyes rolled slightly, breathing continued hurried and labored ; body broke out in perspiration, bowels freely moved. At 10·30 P.M. a blister was applied over the scalp ; improvement continued, although he appeared to be very restless.

9th.—With the exception of occasional dozes passed a restless night ; when roused understands what is said to him ; breathing hurried, ster-

torous, and accompanied with the same peculiar noise in the throat. On percussion no distinct dulness is perceptible, large and small moist rales heard over the whole of the chest, but these are rendered obscure by the noise in the throat. Pulse rapid and small, and does not now intermit. Tongue moist and clean, on protrusion is drawn to left side; bowels moved several times during the night. Urine moderate in quantity and red from admixture of blood; he drank some coffee this morning. A sinapism to be applied to the chest; and to take an eighth of a grain of tartar emetic every two hours. *Vespere.*—Continued restless all day, but slept for about two hours during the forenoon. Is a little more intelligent, and on being asked whether he had any pain, points to his head; state of circulation and respiration unchanged, skin hot, and bowels freely moved. Twelve leeches were applied to the temples; five grains of James' powder given, and tartar emetic ordered to be continued.

10th.—Did not get any sleep last night, but kept tossing about from side to side; when questioned he answered in a husky voice, and with apparent difficulty; tongue is still protruded to left side, and is covered with a brown dry crust. Respiration continues quick, and is accompanied with the peculiar stertor before mentioned; there is neither cough nor expectoration, moist rales still heard over the chest. Hæmaturia still present, pulse quick and a little hard, the tartar emetic increased to $\frac{1}{6}$ of a grain every two hours, sinapism to chest repeated, as he complains of some pain there. *Vespere.*—Went on favourably until about 2·30 P.M., when he fell back in a convulsive fit, with clenched teeth and spasmodic contraction of the muscles; this was accompanied by increase of the dyspnœa, lividity, and blueness of face and lips, insensibility, dilatation of the pupils and failure of the pulse. An antispasmodic was given with but little benefit: at 3·30 P.M., pulse was scarcely perceptible at the wrist, and he could only be made to swallow some wine with extreme difficulty. He got rapidly worse, and sunk at 4·45 P.M.

Sectio Cadaveris post horas $12\frac{1}{2}$.—Body muscular, on external surface posteriorly great ecchymosis present. Head,—about three drachms of effused blood, between calvarium and dura mater, evidently derived from a rupture of the superior longitudinal sinus, near its termination posteriorly. Two layers of arachnoid adherent to a small extent about posterior third of cerebrum at the margin of longitudinal fissure; vessels much congested with dark venous blood; about half an ounce of serum

in lateral ventricles. A section of brain shows an increased number of vascular points. Thorax,—right pleura slightly adherent, posteriorly strong adhesions present on left side, engorgement of the lungs generally with dark coloured blood, particularly in the lower and posterior portions. Near the base of right lung a spot about the size of a hen's egg, was softened and broken down by rupture of the pulmonary substance, and extravasation of blood. Heart,—some serous effusion in pericardium, left side of heart contracted and empty, walls of ventricle rather thicker than natural. Right side filled with dark venous blood, valves healthy, muscular substance congested. Abdomen,—liver rather above normal size, pale in colour, and vessels full of venous blood, spleen congested, kidneys also much congested, stomach empty, great congestion of its vessels, and in several places on the mucous membrane extravasation of blood had taken place; intestines appeared to partake of the general congested condition of the other internal organs, but were in other respects healthy.

No. 5.

On the composition of the liquid disengaged from mud volcanoes in Sind, &c.—Extracted from Dr. LALOR's paper read before the Medical and Physical Society in August 1862: the analyses by Dr. Haines.

Analysis of Bottle No. I. from a Khoop, 180 feet high, at Hookee.

Specific gravity at 60° F. 1,099·03; alkaline; 1,000 grain measures, evaporated to dryness, leave solids 140·96 grains.

	Found in 1,000 grains.
Chloride of Sodium	118·686
Carbonate of Soda	20·236
Sulphate of Soda	·974
Chloride of Potassium	·100
Carbonate of Lime	·075
,, Magnesia	·055
Silica	·040
Total Solids	140·166
Sulphuretted Hydrogen Gas	·053

Bottle No. II., was mud taken from a jet fifty feet above the surface of the ground in the side of a "Khoop" at Hoormara, nearly seventy

miles further westward; and about ten instead of two from the sea. The height of this, it will be recollected, was between four and five hundred feet, and the liquid in the crater all but quiescent.

Specific gravity of water in No. II. 1011·4; neutral. This was some water from the settling of the mud by the time it reached Bombay. The mud is chiefly finely-divided carbonate of lime, with a little dark coloured clay. Dr. Haines adds likewise, that the water is of a most interesting nature, and contains a very "decided impregnation of Iodine, a circumstance most unusual," but that a further quantity is required, which may be obtained during the next season of the Hindoo pilgrimage. For seldom, if ever, else, indeed, is a visitor seen on this dreary and truly "inauspicious coast."

The heaving up of the mud, he attributes to gaseous influence, and it would be highly interesting and satisfactory, as he says, if some of these gases could be collected at the "Khoops."

No. 6.

*Cases resembling the Typhoid Fever of Europe.** Recorded by Assistant Surgeon Niven, M.D., H.M. 103rd Regiment.

Case 1.—Private J. S., H.M. 103rd Foot; age 27 years; three years' service; by occupation a labourer; a man of fair muscular development, with light coloured hair. Admitted into hospital on 30th August with symptoms of a common catarrh, cough troublesome, and expectoration considerable, but no constitutional disturbance. States that he has been ailing for the last three days.

On 3rd September he had a febrile paroxysm which returned on the afternoon of the 4th. Quinine was administered, and he experienced no febrile paroxysm on the 5th.

September 6th.— Complained of pain in epigastrium, was restless, and the pulse 90, tongue white.

September 7th.—Early this morning was suddenly seized with severe pain in the abdomen, which was relieved by fomentation and turpentine

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* Dr. Niven remarks, "I am inclined to consider the disease of the same nature as typhoid fever, although at the commencement the symptoms assume an intermitting character."—*Note by Secretary.*

stupes, and he continued pretty well during the day, but the abdominal pain returned with greater severity about 10 o'clock, and he died before midnight.

Autopsy 8 hours after death.—External appearance,—body emaciated, rigor mortis present, muscular contractions in forearms and hands. Head,—adhesions around glandulæ pacchioni greater than usual; membranes and substance of brain healthy. Thorax,—adhesions at apex of right lung, which was much congested and contained, a hard tubercular deposit about the size of a filbert. Abdomen,—peritoneal cavity contained a large quantity of dirty-looking serum mixed with loose flocculent masses of fibrine; the membrane instead of being smooth and polished, was rough and opaque throughout, and over the ileum and ascending colon of a bright red colour. At the lower end of ileum was a black gangrenous patch with an ulcer in its centre, giving passage to the contents of the bowel. There were four small ulcers in the middle of the ileum, and two about the size of a rupee at its lower extremity; one of these latter had perforated all the intestinal coats, and corresponded with the gangrenous patch observed outside; the mucus membrane was of a darker colour than usual; there was much thickening of the membranes about the cœcum, and the glands of the colon were large and congested. No fœcal accumulations. The liver weighed 3 lbs. 10 oz., was congested and presented pale brown patches on its surface, but the discoloration did not extend above a few lines in depth.

Case 2.—Private J. M., H.M. 103rd Foot; age 22 years; 3 years' service; a man of fair complexion, with light brown hair; formerly a gentleman's servant. Admitted 14th August, complaining of sickness at stomach and headache. Says he has been suffering from fever for some days.

Between the 15th and 19th he had some tendency to looseness of the bowels, but there was no purging and he complained of no pain.

August 20th.—There is some fever, looks pale and anemic.

August 22nd.—Complains of headache, but has no fever and no looseness of the bowels.

August 23rd.—Is reported to be feverish, but no headache; bowels regular.

August 27th.—Has had no fever for some days, bowels loose, pulse pretty good, tongue clean, skin moist and warm.

August 29th.—Expresses a wish to go to duty, says he feels quite well. He is discharged accordingly.

August 30th.—Re-admitted complaining of looseness of the bowels. States that he was quite well when he left the Hospital yesterday, and only got the bowel complaint this morning. The dejections are scanty, chiefly consisting of blood and slime. Abdomen tender on pressure, pulse 96 small and compressible, tongue coated with a white fur.

September 1st.—Purged five times during the night, stools light coloured ; the abdominal tenderness not so great, pulse 80, tongue coated.

September 2nd.—Purged twice last night, dejections pale, no abdominal tenderness, pulse 90 and of moderate volume, tongue clean.

September 3rd.—Had an attack of fever at 10 o'clock last night. Pulse is now 90 small and wiry, tongue coated.

September 4th.—Had a return of the fever last night, pulse 90, tongue coated.

September 5th.—Had an accession of fever again last night, pulse 84 feeble, tongue coated and clammy, dark streak in centre. Bowels were moved thrice during the day and twice in the night, dejection liquid and of a dark brown colour. Towards evening he looked more feeble and exhausted.

September 6th.—Was delirious part of last night. The abdomen is puffy, and the pulse feeble and the tongue covered with sordes.

September 7th.—Raving occasionally, pulse 90 of better volume. He lies in a weak low state, but takes beef tea when roused up. Three liquid dejections in the night of a dark brown color.

September 8th.—Has been raving a good deal, passes his motions in bed, still takes beef tea.

September 9th.—Appears to be sinking fast. Died at 1 P.M. this day.

Autopsy 5 hours after death.—External appearance,—body emaciated, no rigor mortis. Head,—pia mater injected, ecchymose patch on left hemisphere which was softer than the right, weight of brain 47oz. Thorax,—pleural adhesions on right side, lungs collapsed, much congested and portions hepatized. Heart was small, left side hard and

contracted, right soft and flaccid, ventricles empty. Abdomen,—peritoneum discoloured, and over the ileum colon of a livid bluish tint, omentum puckered up. Mucous membrane of stomach and jejunum pale, that of duodenum red and injected. The ileum was studded with ulcers throughout its whole length, and those at its lower extremity were in a gangrenous state. The colon contained many small ulcers about the size of pin heads, with hard raised edges of a pale colour. These ulcers in the colon resembled small bone buttons with a black point in the centre. About six inches of the ascending colon was much contracted, and of a pale yellow colour. A living worm (ascaris lumbricoides) was found in the ileum. Other organs appeared healthy.

Case 3.—Case of intermittent fever, result death, ulcers in ileum and cœcum. At Aden in autumn of 1855.

Private T. B., of 86th Foot, aged 24 years; 4 years in India; a young man of nervous temperament, with light hair, fine skin and delicate features. Was three weeks in Hospital in Camp suffering from intermittent fever, attended with unusual debility, and on account of which he was sent to the Sanitarium at Steamer Point on 4th October, where he died four days afterwards.

The following notes were taken from the Case Book of the Hospital at Steamer Point and given to me by Assistant Surgeon Stedman, at that time in medical charge.

October 5th, 1855.—Has been sent from Camp for change of air, and is suffering from debility after fever; complains of great prostration; is deaf, and appears hardly able to stand; seems agitated, and his voice is feeble and faltering; skin bedewed with perspiration, complexion sallow, and anemic looking; tongue loaded with a thick brown fur and almost black in centre; bowels regular.

October 6th.—Says he slept soundly last night. Continues in same feeble state, but complains of no pain; pulse very feeble and tremulous, tongue loaded with thick dark fur, bowels regular, urine natural.

October 7th.—Since midnight has been in a state of muttering delirium, and very restless. At the commencement of the night had slight epistaxis, and passed a copious watery stool involuntarily in bed. He is now constantly picking his nose, his features are sunken, and he answers questions only on being roused; pulse 115 feeble and

faltering, respirations 26, tongue loaded, lips dry, skin hot and dry. At midday he seemed somewhat revived, but in the evening the pupils were dilated, and he could not be roused to answer questions.

October 8th.— Patient gradually became comatose, and he died during the night.

Autopsy.—External appearance,— body emaciated, cadaverous rigidity well marked. Head,—some effusion of lymph on pia mater, and opaque spots on arachnoid, substance of brain congested and ventricles distended with serum. Thorax,—lungs healthy, slight effusion of serum into pericardium; heart, substance soft. Abdomen,—liver mottled and rather soft, stomach healthy, at the lower part of ileum were a few small ulcers with ragged edges, and an uneven surface covered with a greyish looking matter, in the cœcum were some larger sized ulcers of the same character as those in ileum, also considerable thickening of its coats.

Case 4.—Notes of a case of Intermittent Fever terminating fatally from rupture of bowel. Ulcers in ileum and colon. Five weeks in Hospital.

Gunner W. S., of Bombay Artillery; age 28 years; 8 years in India; a man of rather weak constitution, with dark hair.

Admitted into Artillery Hospital at Aden on 16th September 1855. Complains of headache and weakness. He states that he has had daily attacks of fever for some time back, has no shivering, the fever comes on gradually, continues a few hours and terminates in perspiration. Bowels confined, and tongue foul.

September 17th.—Had a febrile paroxysm last night which terminated in profuse perspiration. Complains of a dull pain and weakness in lower extremities. No pyrexia at present. Between 18th September and 1st October, was taking quinine and continued free from febrile attacks, the appetite was pretty good, and the bowels regular, but he daily complained of feeling weak and exhausted.

October 3rd.—Was seized with rigors last night, which ended in heat of skin and perspiration. Has now pain and tenderness over whole of abdomen, pulse natural, tongue clean, bowels confined.

October 4th.—No return of rigors, no pyrexia, bowels well opened yesterday, pulse natural, tongue white.

October 5th.—No febrile paroxysm, abdominal pain and tenderness gone, bowels free, tongue clean.

October 8th.—No fever last three days. The debility continues, he is very thin and there is a tendency to œdema of the feet. Between the 9th and 21st he was taking quinine and iron, and seemed to improve a little; although he made daily complaints of weakness, especially about the knees, still he walked about the ward.

October 22nd.—Was suddenly seized this morning, while at stool, with a violent pain in right iliac region, extending upwards along the course of the colon. The pain was much increased on pressure and rapidly extended over the whole abdomen, which soon became hard and very tender.

October 23rd.—Passed a restless night, the pain was not relieved by the leeches and fomentations, but the bowels were moved several times by enema.

October 24th.—Passed several copious watery dejections during last 24 hours. Countenance cadaverous looking, breathing hurried and feeble with deep sighs, pulse rapid and feeble. Died at 11 A.M. this day.

Autopsy 5 hours after death.—External appearance,—body thin and emaciated. Thorax,—lungs and heart healthy. Abdomen,—liver soft, a livid coloured patch on convex surface penetrating a few lines in depth. Peritoneal cavity filled with muddy serum, mixed with sanous and puriform matter; omentum thickened and adhering to folds of intestines. Lower third of ileum, and ascending colon covered with black gangrenous patches, and small ulcerated openings were visible in these patches. Several ulcers existed in lower portion of ileum, in cæcum and colon; some of these ulcers were circular and about the size of a four anna piece (sixpence), others were oval, and of much larger size, deep and ragged in appearance; two in the colon and one in ileum had perforated all the coats, and given outlet to fœcal matter.

No. 7

Notes of three fatal cases—returned as Typhoid Fever—which occurred in H. M.'s 56th Regiment, at Deesa.—Presented to the Society by Assistant Surgeon LONGHEED.*

CASE 1.—Private Charles Goodwin, age 18; 3 years' service; service in India 9 months.

A delicate looking man, was admitted into Hospital on the 16th October 1862, with Febris Intermittens. Had a slight attack on that day, progressed favourably, only complaining of debility, until 20th, when he complained of griping pains over the abdomen (no pain on pressure), bowels loose, stools liquid, low fever continued until the 24th, when on attempting to get out of bed he fainted, the stools became more frequent, mixed with blood and slime, the abdomen swollen and tympanitic; on the morning of the 25th he was attacked with hæmorrhage from the bowels and died at 12 o'clock.

Post-mortem appearance 32 hours after death.—External appearances,—body emaciated. Head,—on removing the skull cap about 10 ounces of fluid escaped, there was a curdy deposit between the arachnoid membrane and the brain, the substance of the brain soft; congestion of the veins of the cerebellum. Thorax,—lungs healthy. Heart small, the wall of the left ventricle nearly 2 inches thick, right ventricle large, walls thin. Abdomen,—stomach healthy, distended with gas, the duodenum healthy, the lower portion of the jejunum slighty inflamed. Ileum of a bright scarlet colour, in it there were two small ulcers: the cæcum extensively ulcerated, and apparently gangrenous, a large clot of blood filled the cavity, the other intestines blanched. Liver large of a bright cinnamon colour, firm when cut into, containing scarcely any blood. Spleen congested; kidneys healthy, bladder healthy.

CASE 2.—Private Thomas Lee, age 21; service 3 years; service in India 6 months.

A healthy looking man, admitted into Hospital on the 11th September with Diarrhœa. On the 13th he became slightly delirious, skin hot

* These interesting notes reached the society through the obliging intervention of Mr. Hanbury, Surgeon to H. M.'s 33rd Regiment. In a further communication to that gentleman, Dr. Longheed adds the important fact that occasionally the "rash" was seen in the cases occuring at Deesa, and expresses his opinion that these cases were similar to those recorded in the last volume of the Transactions by Mr. Hanbury.—*Note by Secretary.*

and dry, pulse 86. In the evening the delirium was of a low character, and he became very restless; pupils dilated, stools scanty, and not so natural as on the previous day. 14th.—Very low, chest and arms covered with dark-coloured macula. Abdomen tympanitic, pulse occasionally not perceptible at the wrist, bowels not moved during the night; during the day passed fœces involuntary, extremities became cold, and the macula began to disappear. He gradually sank and died at 4½ o'clock P.M.

Post-mortem appearances 14 *hours after death.*—External appearance,—the body was that of a muscular man. Head,—on the removal of the skull cap about 4 ounces of dark-coloured fluid blood escaped, the veins were distended, the substance of the brain was firm and healthy. Thorax,—the heart large, both ventricles filled with fluid blood: the pericardium thick, adherent to the chest, requiring considerable force to break down the adhesions, lungs both very much congested, the left small and adherent. Abdomen,—liver very large and firm, extending into the left hypochondriac region, of a light nutmeg colour, gall bladder full of bile. Stomach healthy, distended with gas. Intestines, both large and small presented marks of inflammation, both Peyer's and Brunner's glands inflamed, there was extensive superficial ulceration of the cæcum. Kidneys small but healthy, spleen small, very dark coloured and congested; bladder empty and healthy.

Case 3.—Private George Lodge; age 21; service 2 years; service in India, 9 months.

A delicate looking man, admitted into Hospital on the 30th September 1862, with Febris Continua. Had a slight attack of ague on the 2nd, and another on the 3rd of October; complained only of debility until the 7th, when he had a slight attack of diarrhœa, and the abdomen became slightly swollen and tympanitic. On the 10th he complained of violent headache, which was relieved by the application of a few leeches; on the 21st there was slight delirium; tongue brown and dry, stools dark-coloured and very offensive; pulse gradually becoming very feeble, extreme debility and emaciation. 24th.—Lies on his back muttering and picking the bed clothes, nearly unconscious, pulse occasionally imperceptible, pupils dilated. The above symptoms continued until the 26th October, when he died.

Post-mortem appearances 14 *hours after death.*—External appearances,—body greatly emaciated, marks of blistering and leeching over the

epigastrium, blistering to the nape of the neck, and leeching to the temples. Head,—not examined. Thorax,—lungs healthy, adherent to the walls of the chest, and the diaphragm, on the right side. Pericardium firmly adherent to the chest. Heart large, with a deposit of fibrine on the anterior portion of the left ventricle. Abdomen,—stomach distended with gas, the blood vessels congested. Liver very large, firmly adherent to the diaphragm, the substance soft and easily broken with the fingers. Gall bladder empty, spleen very large and congested. The whole of the intestines presented externally a greenish tint. On cutting them open the lower portion of the ileum (about 16 inches) was studded with ulcers, and gangrenous looking. The caput cæcum was one mass of ulcers. The colon and rectum were also studded with ulcers. Kidneys healthy ; bladder healthy.

No. 8.

An account of a case in which the Menses were apparently substituted by Hæmorrhage from the Skin.—Taken from a communication to the Grant College Medical Society, by Mr. A. P. d'Andrade, Graduate of the College.

The subject of this affection is a stout healthy Parsee lady, aged 18, and lives in Bombay. She applied for treatment on the 25th of July 1861, for amenorrhœa and hysteria.

She menstruated at thirteen, and continued regular until about two years and a half since, when the catamenia became irregular and scanty, and ultimately ceased, being replaced by bleeding at the gums and nose, and vomiting of blood. By an appropriate regimen and treatment, however, the menses returned although in a very scanty form, in which they continued up to May last. She has no children, and is not happy with her husband. Being of a somewhat irritable temper, she often gives way to fits of hysterical convulsions, preceded by a globus hystericus. The paroxysms are accompanied with a partial insensibility, closure of the eye-lids and a locked jaw. The convulsions are general, and though not always of a violent form, the fits at times last for several hours, and are so severe as to require a strong electric shock, or a pouring of a large quantity of cold water upon her face ; the latter, however, was sometimes difficult of being properly used on account of her great struggles. On using electricity

one of the poles was applied to the hand, and the other to the forehead with immediate success. Together with these symptoms she suffered also from headache, pain in the joints, and in the different regions of the abdomen and chest, particularly on the left side close to the mamma. There was no leucorrhœa, and nothing abnormal could be detected by an uterine examination. The treatment consisted in leeches to the vulva, hip bath, alœtic purgatives, emenagogues, tonics and antispasmodics of all kinds, also sea bathing and exercise. The symptoms, although in a mitigated form, continued till October last, when all the medication was stopped, and she was advised for a change to Poona, but without any benefit.

In January last she informed me of the following peculiarity in her person, viz. that whilst in Poona, during the expected period of the menses, a general red appearance of the body was once or twice noticed, particularly of the face, chest, and arms ; and in February, that bleeding had taken place from her leg without any visible ulcers, or breach of the skin.

On the 6th of March of the current year, about three or four days after the menses, I personally observed blood slowly exuding from the healthy skin of the left breast outside the areola, and of the right forearm immediately above the wrist ; and on the 1st of April from the right knee and leg close to the ankle. The bleeding repeated from the breast on the 9th June, 13th July, and 7th August, and the subsequent day or two. She experiences first a sense of itching, smarting, and tenderness in a space about the size of a rupee, which in a short time becomes somewhat puffy and rose-coloured, like erythema. Within an hour or more a sort of dew of a serous fluid, and a number of fine points, like those that are seen during the act of perspiration, appear upon that portion of the skin, which quickly become pink-coloured, and then the little points of blood are seen oozing out slowly, which, being wiped away, reappear, and that again and again. They collect themselves in drops and trickle down her body, and thus an ounce or more of the sanguineous fluid may be obtained. The discharge continued for ten, fifteen, or twenty minutes, and stopped of itself. It was, however, accelerated and prolonged by pricking, or otherwise interfering with the part, but it could be arrested by the application of an astringent lotion. The medicine that I used for the sake of experiment was a strong solution of the biborate of soda. Cold water

apparently produced no effect. On ceasing, the discharge gradually diminished, becoming first pale-coloured, then serous and watery, and ultimately it disappeared, leaving only a slight discoloration of the skin, covered sometimes by a scab.

The hæmorrhage was generally repeated two or three days, and the quantity of the blood varied on different occasions from half an ounce to about ten drachms. The blood is thin, and of a dark red colour, neutral, or very slightly alkaline, and does not coagulate; apparently it contains little fibrine, and gives a faint smell. It becomes readily decomposed.

Under the microscope in the fluid there were innumerable red and white corpuscles. There was no tendency to their adherence to form rolls, most of them were perfectly round, but others presented a corrugated and starred appearance. Here and there also occasionally seen dark fatty looking specks, and scales of epithelium.

The hæmorrhage occurred periodically every month or two months, generally within a few days after the period of menstruation, or during the expected period. On several occasions I have seen the discharge proceeding from the rupture of a number of minute vesicles, or small fissures on the areola, close to the nipple; and then the bleeding was rather free.

The blood then also presented under the microscope the same appearances as above described. Once the palmar surface of the metacarpal space of the thumb was of a red colour, the redness remained for a whole day, but no discharge followed.

In the last month, during the expected period of the bleeding from the breast, a red and ecchymosed appearance of the calf of the left leg was noticed about the size of the palm of the hand. It was of a deep red colour at the centre, and bluish black at the margins. This appearance remained for several days without any discharge from it. Half a dozen leeches were applied to the affected part, when the redness gradually faded.

Ever since this case has been under observation the menses have been irregular, and now they are suppressed, yet pain about the pelvis, or rather a sense of weight in the uterine region, attacks the patient periodically. Sometimes there is a copious discharge of blood from the

mucous membrane of the nose and gums, and occasionally from the stomach. When vicarious hæmorrhage does not take place from the skin or the mucous membranes, the constitutional disturbance, viz: headache, giddiness, and convulsions, is most severe, being only relieved after the free discharge, either from the mucous membranes or the skin. From her history, it seems that the patient, for some years back, that is, since her marriage, had to contend with domestic troubles. She is not yet in harmony with her husband, and lives away from him.

The hysterical symptoms continue as severe as before. She has very little appetite, but continues as stout and in good condition as ever; has occasional vomiting and hiccup. Bowels are free. Suffers frequently from retention of urine, and then diuretics, antispasmodics, and hip bath fail to bring on the flow of urine. No sponginess of the gums. The lungs and heart appear to be healthy.

Postscript.—Since the foregoing remarks were read before the Grant College Medical Society, the further progress of the case has been as follows:—

Blood was discharged from the forehead above the left eye-brow on the 11th of September 1862, and on the 15th idem from the same part and the left leg, also from the latter part on the 26th of October.

A similar discharge of blood took place for the first time from the right breast over the areola on the 18th, 23rd and 30th of January 1863; and from the right forearm close to the wrist joint on 6th of February, also from the right breast on the 20th idem; and from the forehead (left side) on the 2nd, from both the mamma over the areola on the 7th, 8th and 11th, and from the left on the 14th, 15th, 16th and 17th of March 1863. On the 25th of September 1862, after a period of four months' suppression, the patient menstruated scantily, and on the 28th idem she passed a dark red coloured urine, having been previously suppressed for several hours, and it continued to be of a more or less red colour till the 4th of October. A distinct red colour of the urine was also noticed on the 3rd of February 1863.

The menstrual function, although very scantily performed indeed, continued with regularity from the 25th of September to the 15th of March 1863.

The hysterical fits are frequent, seem to be rather of a severe form, and not unfrequently are followed in a few hours by a discharge of blood from the skin, or the mucous membrane. Sometimes, when the fit is over, the headache and giddiness are apparently replaced by a temporary derangement of the mind. The patient is not yet in perfect harmony with her husband; and the cutaneous hæmorrhage occurs less periodically, or more frequently than during the last year.

Year.	Day.	Month.	Locality of Hæmorrhage.						
			Left Breast.	Left Forearm.	Left Knee.	Left Leg.	Forehead.	Right Breast.	Right Forearm.
1862	6	March	1	1	..	..	..	..	..
,,	1	April	..	..	1	1	..	..	..
,,	9	June	1	..	..	..	..	..	..
,,	13	July	1	1	..	..	..	..	..
,,	7	August	1	..	..	..	..	..	..
,,	11	September	..	..	..	..	1	..	..
,,	15	,,	..	..	..	1	1	..	..
,,	26	October	..	..	..	1	..	..	..
1863	18	January.	..	..	..	..	..	1	..
,,	23	,,	..	..	..	..	..	1	..
,,	30	,,	..	..	..	..	..	1	..
,,	6	February	..	..	..	..	..	..	1
,,	20	,,	..	..	..	..	..	1	..
,,	2	March	..	..	..	..	1	..	..
,,	7	,,	1	..	..	..	..	1	..
,,	8	,,	1	..	..	..	..	1	..
,,	11	,,	1	..	..	..	..	1	..
,,	14	,,	1	..	..	..	..	..	..
,,	15	,,	1	..	..	..	..	..	..
,,	16	,,	1	..	..	..	..	..	..
,,	17	,,	1	..	..	..	..	..	..

No. 9

Summary of a case of Abscess of the Liver opening into the Pericardium.—By H. V. Carter, M.D., Assistant Surgeon Jamsetjee Jejeebhoy Hospital, Bombay.

An adult Mussulman, native of the Deccan, was admitted into the Jamsetjee Jejeebhoy Hospital, the subject for some months of fever, and more recently of looseness of the bowels; he was in a reduced condition, and complained of some pain in the epigastrium, but the diarrhœa was apparently not of a dysenteric character. There was some fulness in the hypochondria and the fever was mostly nocturnal: under the influence of ipecacuan and opium the stools, which were thin and sometimes streaked with blood, soon became less frequent; but the local pain continued, being strictly limited to a spot just beneath the ensiform cartilage; here two or three blisters were successively applied, with but little relief. A sense of throbbing at the point of the sternum was afterwards noticed. Physical examination of the lungs and abdominal viscera did not reveal clear evidence of disease, but the state of the heart was never ascertained during life, the symptoms not pointing to its derangement. Hydrocyanic acid and carbonate of soda were temporarily exhibited, and afterwards Grey powder and Dover's powder, with the object of affecting the system, but no permanent relief was obtained. The precordial uneasiness persisted, shifting however a little to the right; his strength began to fail; the pulse became feeble, and at times intermitting; puking of thin bile, and scanty action of the bowels followed, and twenty days after admission the patient died from sudden failure of the heart's action.

On *post-mortem* examination the lungs were found healthy, and the pleura free from adhesion or effusion; the sac of the pericardium contained about eight ounces of thin curdy pus, and its layers were covered with lymph. Exactly where the pain had been felt during life the left lobe of the liver was found attached by very vascular adhesions to the under surface of the diaphragm, it was the seat of a defined abscess, the size of an orange, which, pointing upwards, had communicated with the cavity of the pericardium; three small sloughy spots were here noticed, through one of which pus, resembling that contained in the serous sac, readily exuded on slight pres-

sure being made from below. The pericarditis should not probably be wholly referred to the presence of pus, the entrance of which it would seem to have preceded, having considerably advanced before death, although no marked general symptoms revealed its occurrence during life. The remainder of the liver substance was much congested: the spleen and kidnies were congested, the mucous membrane of the stomach and intestines was healthy.

Remarks.—This necessarily fatal result of hepatic abscess appears to be very unusual; Dr. Morehead had never seen an instance of it, and the case he refers to as recorded in these Transactions, is not very clear as to the connections of the abscess. The rarity of similar cases is the only excuse for printing the above scantry details.

No. 10.

Note on Mycetoma, the Fungus-disease of India.—By Assistant Surgeon H. V. Carter.

Instances of this remarkable affection are sufficiently numerous in Bombay and elsewhere, to fully warrant its admission on the nosological list of Indian diseases as a specific malady.

At the close of May last year, Mr. Sudashew Hemraz, the medical attendant of the Rao of Kutch, forwarded to me three specimens, one of the foot, and two of the upper extremity and finger, accompanied with notes of the case; and shortly afterwards he communicated the details of a fourth case in which the foot was the part affected.

In the Jamsetjee Jejeebhoy Hostpital two well-marked instances of Mycetoma have been seen during the past year, amputation of the foot being performed in one, August 9th, 1862; both these were of the commonest form of the second variety, while two of Mr. Hemraz's were of the first or black variety. No instances of the more unusual forms previously described by me have been lately seen; nor did any of the above present features of sufficient novelty to require lengthened notice. I may mention, however, that in the foot amputated at the Jamsetjee Jejeebhoy Hospital, a few of those peculiar brood-cells termed "myeloid," were found amongst the disintegrated tissues; the patient was a young man, and there is nothing in this circumstance to call for special remark.

The *treatment* of Mycetoma is a subject well worthy of attention; the progress of the disease is slow enough to allow of local applications being fairly tried, and diagnosis may sometimes be made at a very early stage. The object would be either to remove by caustic or knife the whole of the diseased mass, or else to attack the exciting cause, and by means of some vegetable-killing poison to kill the fungus-growth. Mr. Hemraz mentions his having used, as he thinks effectually, for the former purpose, strong nitric acid; a proceeding which would not have been applicable in one of the Jamsetjee Jejeebhoy Hospital cases, for here, though the disease was in a comparatively early stage, too large a portion of the foot was implicated. And as regards the injection of chemical solutions into the sinuses and canals of the growth so as to operate directly upon the parasite, I own myself sceptical as to its efficacy: the fecundity of the fungus, particularly of the black variety, is wonderful, and the length and tortuosity of the canals are very unfavourable to the passage of fluid along them. Fungi and cryptogams inhabiting the mucous cavities, or growing on the surface, are more readily attacked. In this poverty of means, the patient last referred to had to be left unrelieved, because the disease had not made sufficient progress to render amputation (the only resource) advisable, and yet there seemed no likelihood of local treatment being effectual in eradicating the disease.

The *real character of the parasitic fungus* appears to be now ascertained, and the red mould noticed in the Appendix to my Observations on this disease, published last year in these Transactions (Vol. VII. new series, p. 220), would seem to be the normal form of the fungus. The Rev. M. J. Berkeley, with whom I had already been in communication on the subject, having been provided with further information by Mr. H. J. Carter, now in England, furnished to a popular scientific Journal* a short account of the disease, and there he states that this red "mould is, it can scarcely be doubted, the perfect form of the species, "though at present it has not been observed in any other situation; a "circumstance, however," he adds, "which need excite no surprise, as "so little attention has hitherto been paid to the minute fungi of "India." The opinion of this eminent mycologist must, I presume, be considered, in view of all known facts, as conclusive; and since the date of my last remarks, I have obtained by experiment, besides witnessing a fourth instance of spontanous growth, some confirmatory

* The *Intellectual Observer*, for November 1862, p. 248.

evidence of the accuracy of that opinion, having been able to watch the origin of the red mould from fungus particles not only of the black variety, but also of the second or more common form, and with the aid of the miscroscope, have seen its filaments springing from the interior of the latter. Such evidence is the only proof yet obtained of the nature of several forms of *Sclerotium*, few, if any, of which have ever been produced artificially from a given species, although their development into the normal or perfect form has, as in the present case, been effected by experiment. Mr. Berkeley is not inclined to agree with the views I formerly expressed as to the possible connection of the Fungus of Mycetoma with the rusts and mildews infesting many plants; and as just intimated, I now think it is rather amongst the moulds (mucor) we must look for the parent of the former. He considers the facts already made known warrant the specific distinction of the red mould, which although closely resembling *mucor*—identical I should myself say—is yet more like the genus *Chionyphe*, whence his proposed name and definition—"*Chionyphe Carteri* hyphasmate ex albo flavo-rubroque "sporangiis demum coccineis; sporis breviter fusiformibus."

It now remains for us in India to search for this mould on the surface of the soil, &c. as will perhaps be done with most success during the monsoon; and the fortunate discoverer will add the remaining link, should his observations be complete, in the history of a disease which is as yet unique in both character and locality: that the task is no easy one may well be judged, since in the instance of a parasitic affection far longer under our notice—I mean guinea-worm—this final step has not yet been made, indeed the natural history of Dracunculus is hardly so advanced as that of Mycetoma.

ABSTRACT PROCEEDINGS

OF THE

MEETINGS OF THE MEDICAL AND PHYSICAL SOCIETY,

FOR THE YEAR 1862.

COMMITTEE MEETING HELD 21ST JANUARY 1862.

Present.

H. J. Carter, Esq., F.R.S.; J. Peet, M.D.; R. Haines, M.B.; and W. C. Coles, M.D.

The Committee having met proceeded to consider the finances of the Society, and after an examination of the balance in the Bombay Bank and of the outstanding bills, and after taking into consideration the probable annual expenditure, determined that Rs. 1,000 might be invested in the 5 per cent. Government Securities, in the name of the Secretary for the time being, which was directed to be carried out.

2. The Committee further considered that it would be advisable to submit for the votes of members a proposition to cancel so much of Rule VIII. as relates to the admission fee of Rupees 5 on election as a member of the Society, which in their opinion can be dispensed with.

3. Drs. Carter, Haines and Coles then formed themselves into a Sub-Committee on the Library, and the General Committee was dissolved.

No. 1.

MONTHLY MEETING HELD 1ST FEBRUARY 1862.

Present.

H. J. Carter, Esq., F.R.S., *President*, in the Chair.

J. Peet, M.D., F.R.C.P., *Vice-President*.

Members.—T. Diver, M.D.; T. B. Johnstone, M.D.; F. Broughton, Esq.; J. Welsh, Esq.; W. G. Hunter, Esq.; G. R. Ballingall, M.D.; H. V. Carter, M.D.; and W. C. Coles, M.D., *Secretary*.

The proceedings of the last monthly meeting held on the 3rd December 1861, and of the Committee meeting held on the 21st January 1862, were read and confirmed.

It was announced that Dr. McDougall, who was proposed by Dr. Campbell, and seconded by the Secretary, as a member of the Society, under Rule VI., would be ballotted for at the next meeting.

The presents for the Library, consisting of the last published "volume of the Asiatic Society," "the Meteorological Observations for 1860" from Government, the 6th number of the "Madras Quarterly Journal," "the Chemist and Druggist for December," and four numbers of the "British Medical Journal" were laid upon the table.

The paper selected for the consideration of the meeting, entitled, Typhoid Fever in India, its clinical characters, morbid anatomy, and etiological relations, by Surgeon W. Hanbury, 33rd Foot, was then read. This is a highly important and interesting paper, and will be published in the Society's Transactions. The author, after referring to the little recorded evidence of the existence of typhoid fever in India, relates six fatal cases which fell under his observation in the 33rd Regiment of Foot at Deesa in the autumn of 1859, enumerates the leading symptoms which characterised the disease, and enters minutely into the appearances presented after death. Upon these data the writer proceeds to investigate the clinical characters, the morbid anatomy and the etiological relations of the disease, and leaves little room to doubt that the inferences drawn are strictly correct as to the existence of typhoid fever.

The paper characterised by the able manner in which the subject is treated, the careful mode of investigation pursued, and the satisfactory results which followed upon the disease being recognised, and upon essential sanitary measures being carried out.

Some discussion ensued on several points regarding the discrimination of typhoid fever from remittent and other fevers, and a wish was expressed that the author had added instances of recovery from the disease, as well as an outline of the treatment pursued both in fatal and recovered cases.

A few short notes on the use of dilute nitric acid in the treatment of intermittent fever by Sub-Assistant Surgeon Bazunjee Rustomjee were read, and after the meeting had voted the best thanks to Mr. Hanbury for his valuable contribution, the President announced its adjournment till Saturday, the 1st March next.

No. 2.

MONTHLY MEETING HELD 1ST MARCH 1862.

Present.

J. Peet, M.D., *Vice-President*, in the Chair.

R. Haines, M.B., *Vice-President*.

Members.—W. Hanbury, Esq.; T.B. Johnstone, M.D.; F. Broughton, Esq.; J. M. Hyslop, M.D.; G. R. Ballingall, M.D.; J. Welsh, Esq.; G. C. M. Birdwood, M.D.; H. V. Carter, M.D.; and W. C. Coles, M.D., *Secretary*.

The proceedings of the meeting held on the 1st February were read and confirmed.

J. McDougall, M.D., was unanimously elected a member of the Society under Regulation VI.

The numbers of the "British Medical Journal" and the "Chemist," received since the last meeting, were laid upon the table.

The first paper read was entitled, Observations on Leprosy, part 1st, by Dr. H. V. Carter. The author stated that Leprosy had for some time engaged his attention and was still under investigation, but as important results had already been evolved, it was thought desirable to bring them before the notice of the Society. After a few comments on the only complete researches yet published, those of Messrs. Danielssen and Boeck, Physicians in Norway, where Leprosy still prevails, pointing out some differences in their conclusions and the present writer's, the description of a case of Leprosy in the Jamsetjee Jejeebhoy Hospital was given in detail, and from this instance, as well as others occurring subsequently, it was shown that the loss of feeling or Anasthesia, so

characteristic of most forms of Leprosy, is solely owing to enlargement of the sensory nerves supplying the benumbed parts, accompanied with compression of the nerve-fibres, so that their function is greatly interfered with or even destroyed. The microscopic appearances of the affected parts were then described and illustrated by drawings; they are peculiar to this disease, and so far as the author was aware, are now first made known. It is no longer a matter of surprise that confirmed Leprosy is so little amenable to treatment. The connection of this disease with some others was then pointed out, reference being made to cases in the Jamsetjee Jejeebhoy Hospital.

Dr. Peet read notes of two fatal cases in which fibrinous concretions in the heart were found after death.

That portion of the annual report on the Jail Hospital, Ahmednuggur, by the Acting Civil Surgeon, Dr. Cook, was then read, which related to the measurement and registration of "Ozone," and upon which some discussion followed.

A communication was read from Dr. Lownds on the use of Liebeg's cold soup; and after the best thanks of the meeting had been awarded to contributors of papers, the Chairman adjourned the meeting for the recess of three months, the next meeting to take place on the first Saturday in July.

No. 3.

MONTHLY MEETING HELD 5TH JULY 1862.

Present.

J. Peet, M.D., F.R.C.P., *Vice-President*, in the Chair.

Members.—W. Hanbury, Esq.; A. Wright, Esq.; H. Giraud, M.D.; T. B. Johnstone, M.D.; F. Broughton, Esq., F.R.C.S.; T. Diver, Esq.; J. Welsh, Esq.; W. G. Hunter, Esq., F.R.C.S.; G. Birdwood, M.D., and H. V. Carter, M.D., *Secretary*.

The proceedings of the meeting held on the 1st March last were read and confirmed.

A letter from Dr. B. Niven, acknowledging the receipt of the Transactions was read, also one from M. D. Pereira (addressed from the Mission House, Ambrolie), regarding an indigenous remedy for Fever, &c. (named "Alpeh") employed in Persia, was read. The accompanying

specimen of the plant so used was, in the absence of the Professor of Materia Medica, entrusted to Dr. Birdwood, for identification.

The following letters, and resolutions of the Managing Committee thereon, were then read and agreed to :—

From the Secretary, W. C. Coles, M.D.

To the President, Vice-Presidents and Committee of the Medical and Physical Society.

Gentlemen,—Consequent upon being about to proceed to Europe for six months, it is necessary that I tender the resignation of Secretary to the Society.

I have ascertained that, if it is in accordance with the wishes of the Committee, Dr. H. V. Carter will be happy to become Secretary, and to him, under the directions of the Committee, I will make over charge.

I have the honour to be, &c.

(Signed) W. C. Coles, Secretary.

Bombay Medical and Physical Society's Rooms, 1st May 1862.

Memo. on receipt of the above letter.

If it be absolutely necessary that on account of his going to Europe Dr. Coles' valuable services as Secretary should be permanently lost to the Society, it is desirable that we should take this opportunity of acknowledging them, as well as, out of respect to Dr. Coles, accepting the nomination of the Gentleman whom he has proposed to be his successor.

I would therefore suggest that the following resolution should be passed by us, read at the next meeting of the Society, and thus having become part of the minutes of that meeting, should be subsequently printed in the Society's Transactions :—

Resolution.—That the Members of the Committee feeling under deep obligation to Dr. Coles for his valuable services during the period of eight years that he has held the Secretaryship, do hereby record their conviction of the great advancement the Society has made in the fulfilment of its object under his care, their sense of his steady attachment to its interests, his great ability and unremitting zeal in the performance of his duties, and their regret that his departure for Europe should compel him to tender the resignation of the office which he has held for so long a time with such honour to himself and such profit to the Society.

In accordance with Dr. Coles' nomination, I would propose that Dr. H. V. Carter be appointed to succeed him as Secretary of the Medical and Physical Society.

(Signed) H. J. Carter, *President*,
and Members.

1*st May* 1862.

To The Secretary of the Medical Society of Bombay.

Dear Sir,—As the state of my health renders it desirable that I should go to England for change of air, it becomes necessary that I should request the favour of you to tender to the Society through the Committee of Management, my resignation of the Presidentship.

In doing which I would beg to record my conviction after many years' experience of the usefulness of the Society to the profession and the public generally, and locally, medically and socially, my sincere wishes therefore for its welfare, and lastly, the hope that although distantly separated from it, the Society will still continue to command my services in any way that they may be required for the advancement of its objects.

I remain, &c.
(Signed) H. J. Carter, *President*.

Bombay, 13*th May* 1862.

Resolution of the Committee upon the receipt of Dr. Carter's letter.

We should, I think, in accepting Dr. Carter's resignation place on record our regret that the state of his health should have compelled him to relinquish an office in which, from the deep interest he has taken in the Society, and his scientific attainments, there was just reason to believe he would have done much to promote its prosperity. My colleagues will, I am sure, gladly avail themselves of this opportunity of expressing their cordial appreciation of Dr. Carter's valuable contributions to the Society's Transactions, and of the great services he has rendered it in the office of Vice-President and during a Membership of more than 20 years' duration.

(Signed) J. Peet, *Vice-President*,
and Members.

15*th May* 1862.

A ballot then took place for a President, when Dr. Peet was elected ; for a Secretary, when Dr. Carter was elected ; and for a Vice-President, in the place of Dr. Peet, in which Dr. Giraud was chosen.

Numbers of the "British Medical Journal" "Chemist and Druggist," "Indian Annals of Medicine," and the "Transactions of the Epidemico-logical Society" received since the last meeting were laid on the table, also the Catalogue of the Bombay Geographical Society, presented by the Secretary, and a copy of Dr. Moore's work on the Diseases of India, presented by the author.

The following communication was then read, entitled, "the Sanitary condition of Hill Stations with especial reference to Mount Aboo, by Dr. Moore, in medical charge of the Sanitarium, &c. The writer traces the history of sanitary establishments in India and continues—"I purpose in this paper making an attempt to prove that the advantages derivable from the climate of many Indian Hill Stations are negatived by the neglect of sanitation in such localities, that preventible or mitigable diseases are much more prevalent on Mountain Ranges than they should be ; and that so long as this remains the case, the majority of our Indian Hill Stations can only be regarded as 'retreats from intense heat during the hot months.'"

Then follows a view of a few of the advantages the world has derived from the adoption of sanitary measures. The statement that "there are scarcely any localities where, both on account of the peculiarities of the climate, and the particular conformation of the surface of the ground, sanitary regulations are more demanded than in Indian Hill Stations; neither are there any sites where such requirements may be effectually carried out with greater facility"—is next illustrated by the author in the course of his remarks on Malaria, and the decomposition of organic matters "*viâ siccâ*, et *viâ humidâ*" and the fact is mentioned of cholera having already in confirmation of Dr. Mackay's prophetic warning, made its appearance in the Neilgherries. Extracts follow from published reports, showing the present sanitary condition of some of the Hill Sanitaria, as Simla, Ootacamund, Nynee Tal, Dugshai, Darjeeling, &c., and pointing out their defects, of which Mount Aboo equally partakes. Landour is lauded as a kind of model, and, in conclusion, suggestions are made as to the most efficient means of placing and maintaining the Hill Sanitaria in a

fit sanitary condition. The author expresses his intention to continue this subject.

Extract from the Annual Report of C Battery 4th Royal Horse Brigade for the year 1861, by Dr. Cruikshank. These had reference to the irregular manner in which an epidemic of cholera attacked several separate corps at Nusseerabad, and to the circumstances which might account for the comparative immunity of the Horse Artillery as to the number of cases, and severity of attack. The better working, the stone roofs and more complete isolation of the barracks, and the superior physical condition of the men were pointed out as in favour of the Artillery. Active precautionary and sanitary measures were also adopted.

Some points in the above communications having been discussed, the best thanks of the Society were awarded to the various contributors and donors, and the meeting separated.

MONTHLY MEETING, AUGUST 2ND, 1862.

Present.

Dr. Peet, *President*, in the Chair.

Members.—Drs. Broughton and Hyslop, and Dr. Carter, *Secretary*.

The minutes of the previous meeting having been read and confirmed, a letter from the Under-Secretary to Government, having reference to the formation of a Statistical Department and inviting the co-operation of the Society in collecting statistical information, was then read, and was referred to the Managing Committee for further consideration.

Dr. Thom, Garrison Surgeon, Bombay, had intimated his wish to rejoin the Society.

Numbers of the "Madras Quarterly Journal" and the "British Medical Journal" were laid on the table.

The following papers were then read :—

1. Rough Notes showing outline of the country between Kurrachee and Guadel, by Assistant Surgeon J. Lalor, B.A., 2nd Regiment Sind Horse. The country bordering immediately on the sea coast from Kurrachee to Guadel, and included between parallels 62° and 67° E. Longitude, might be aptly described as a bare and cheerless desert,

intersected occasionally by low hills, with a scanty and almost purely periodic supply of water. Its shore line is singularly straight and even, the difference in the Latitude of any of the places between the above named points, being never more than a few miles. On the road to Sonmiyanee the great Hala range of mountains was crossed, and the river Hubb: here some traces of vegetation were seen and a few wandering Noomreas people; the country is barren on account of the want of water, for onwards a short distance the road is along the sea-shore, afterwards over a long tract of salt land relieved by a solitary oasis, and halting place of pilgrims. The town and harbour of Sonmiyanee were next described: there is little local trade, and fresh water seems to be scarce. Beyond this place the road lies mainly over drifting sand-hills, or low lands on which the sea at times encroaches, forming large swamps in which the mangrove abounds. At Chur, the lesser Hala range of hills is reached; the latter have the appearance of disrupted conical masses, and are composed of clay and ochre beds, tipped with dark sandstone and conglomerate. Near here the Shor hills commence, the first of a series of remarkable white ridges that stud and disfigure the entire face of the country. About seven miles from Phor the mud volcanoes or springs of Hookee are met with: they are three in number, and situated close together, two indeed connected by a curtain of earth about twenty feet in extent and of similar composition and colour. They are distant from the sea about a couple of miles.

Of considerable height and conical shape, they can be seen from eight to ten miles off, and from their symmetry and apparent regularity of structure, resemble artificial mounds of white material, with a few feet of dark, discoloured top. On nearer survey, we find the sides not at all even or rounded, but deeply fissured, and presenting grotesque and fantastic shapes, most nearly resembling a large collection of alligators piled together. Access to the highest (about 350 feet) is easy, except near the crater, where the path becomes slippery. At the summit is a basin of circular form, about forty feet in diameter; within this the liquid mud is heaved up at irregular intervals, and in quantities varying during the time of our visit, from a mere bubble to jets of a foot high, and two or three in circumference.

Sometimes, the action is quite spasmodic, three or four jets following each other in quick succession, with a corresponding interval of

rest. The mud eventually runs over and down the sides, in a glistening stream. In a second, of lower elevation, probably about one hundred and eighty feet high, the mud is much more liquid, the action more regular and continued, and a good deal of water is formed on the settling of the irruption.

The temperature was the same as the earth and water in the locality, and the taste of the brine formed on the subsidence of the mud, salt and nauseous to immediate sickening.

In the action, as well as cause, of those springs, there is much ground for curious and puzzling study. Gypsum and sulphur are found abundantly, and may be met with in a free state here, and amongst the Shor hills before alluded to, there is also apparently a sulpurous taste in the water, but the absence of any rise in temperature, their course of action (to be afterwards mentioned) and the fact that no particular properties are attached to them which is invariably the case in the east, seem opposed to the idea of their being of a sulphurous nature.

Two interesting features deserve notice: 1st, It would appear that when the hills have attained a certain altitude, the action of the volcano ceases. Such might be readily inferred, from the sluggish motion now going on in the highest at Hookee, and from the fact that we found none in the line of Shor hills just mentioned, as varying between three and five hundred feet in height, and where at one time a great volcano is said have been. Again, on subsequently visiting another of greater elevation, and with a circumference at base of a quarter of a mile, situated about ten miles to the north of Hoormara, the mud in the crater was seen to be almost entirely quiescent, and had sunk fully eight feet below the crest; while from the side, and at about fifty feet above the surface, there was oozing on to the plain, a good stream of liquid mud. The people of the country say that the full action is periodic, and reaches its greatest force at the time of spring tides; in fact, that they are wholly connected with the ocean, and like it, influenced by the moon. Hence their Belooch name, Dherya chium (eye of the sea.)

The bay of Kutcherie and the Hingur river were next passed: the general characters of the latter are described, and mention is made of the famous temple of Hinglaj. The road onward to Hoormara passes over a district very scantily supplied with water, and difficult to traverse: crossing the Gorund river, Hoormara was then reached, a fishing village, the inhabitants of which are said to be civil and contented

under native rule. Hence the route is towards Kurmut, afterwards on the coast to Passenoe, and Guadel. The latter locality is discribed as flourishing, it belongs to the Imaum of Muscat and said to have once been in the possession of the Portuguese. Dr Lalor mentions the climate as good. The subsequent portion of his paper is occupied with critical remarks on the identity of the more prominent localities named in the ancient Greek histories of Alexander and Nearchus, with those now to be distinguished along this coast. Having revisited many of these localities from the sea, the author is able to offer some very interesting remarks on this subject. In the Appendix are two analyses of water and of liquid mud from the mud volcanoes of Hookee and Hoormara, by Dr. Haines: the specimen from the former locality contained a considerable quantity of salt, and was alkaline in reaction; of that from the latter, taken a distance of 10 miles from the sea, the solid part or mud consisted principally of carbonate of lime, the supernatent water remarkable for presenting decided traces of iodine, a very unusual occurrence.

2. The next communication was on the subject of the sanitary condition of Hill stations, especially Mount Aboo, being a continuation of Dr. Moore's former paper on this subject. It consisted of numerous tables, and accompanying remarks on the comparative prevalence and mortality of all the chief diseases, during various lengthened periods, at Mount Aboo, and can hardly be condensed so as to convey a correct impression of its contents; but these are of considerable interest. In conclusion the author reiterates his opinion that the sanitary condition of Indian Hill stations is not what it should, or might be, and that until this is improved "the most we can expect from Hill sanitaria is a refuge from intense heat during the hot months of the year."

Some conversation followed on the above and collateral topics, and the thanks of the Society were voted to the contributors, after which the meeting separated.

PROCEEDINGS OF A COMMITTEE HELD 6TH SEPTEMBER 1862, IN THE GRANT MEDICAL COLLEGE.

Present.—Drs. Peet, Haines, and Carter.

1. It being ascertained that the proposition agreed to at the last meeting of the Committee to abolish the entrance fee of Rs. 5 (in

supercession of the first part of Rule 8) had not been carried out, it was resolved that the subject be now referred to the members of the Society for decision.

2. The Committee deeming it desirable that Rule 7 should be applicable to officers of both services and that the period of non-paying membership should at the same time be reduced to one year, adopted the following modification of Rule 7—" Assistant Surgeons of " either the British or Indian service on first arrival at the Bombay " Presidency are considered ordinary members of the Society free of " payment of annual subscription, and continue so for the period of " one year, after which should they not intimate their wish to be " considered ordinary members by payment of the regulated annual " subscription, they are considered to have withdrawn from the " Society."

3. It was proposed and agreed to, that in order to render the existence of the Society better known, and to extend thereby its usefulness, a copy of the last Number of the Transactions be forwarded to Surgeons of the British Army serving in the Presidency, with a copy of the Regulations.

4. The Committee next proceeded to consider the letter from Government referred to at the last meeting of the Society, and a resolution was passed, that the Society would be glad to assist in the collection of statistical information in any way Government might propose, and that the Transactions of the Society be considered at the disposal of Government for the publication of such information.

5. Two members of the Committee having recently left Bombay, the vacancies thus ensuing were directed to be filled up in accordance with Rule XV.

MONTHLY MEETING HELD 6TH SEPTEMBER 1862.

Present.

Dr. Peet, *President*, in the Chair.

Drs. Giraud and Haines, *Vice-Presidents.*

Members.—Dr. Stovell, Principal Inspector General; Drs. Johnstone, Broughton, Hyslop, Ballingall, Hunter, Beatty, Birdwood, Diver, and Dr. Carter, *Secretary.*

The Minutes of the last meeting were read and confirmed.

Dr. Birdwood then presented a brief report on the indigenous febrifuge (called "alpeh") sent to the Society by Mr. Pereira. It seems probable that the herb is nothing more than the common wormwood (Artemisia Absinthum) which has long had some reputation in the treatment of intermittents, but is not considered of much value that way at the present day.

Numbers of the "British Medical Journal," sent by the editor, and the "Report of the Medical College at Lahore," presented by Government, were laid on the table; and other communications read.

The first paper brought before the Society was by Dr. Beatty, it contained an interesting account of a case of *Placenta Prævia* attended by some unusual and unfavourable symptoms; the treatment adopted was explained and commented on by the author, who referred to the opinions of various eminent authorities on this subject, and afterwards exhibited to the Society a case of instruments lately introduced into Obstetric Surgery.

The next communication was on the prevalence of Typhoid Fever in the Bombay Presidency, by the President. Before narrating his own experience of this disease, the author glanced at the ground of distinction of this form of continued fever, regretting, like many others, that the term "Typhoid" should have been applied to it, and in order to render his subsequent remarks more clear, the characters of the disease, as laid down by a distinguished English physician, were read to the Society. The attention of Dr. Peet to the existence of typhoid fever in Bombay was first excited by the occurrence of a case in the beginning of 1859, which he had been requested by one of the College graduates to see; this young patient's case was marked by peculiar features, which precluded its being regarded as one of ordinary remittent fever, with abdominal symptoms, and which favoured the view of its being typhoid fever. Since then numerous similar instances had come before the notice of the author, most of which had not been watched sufficiently long to enable him to lay a full account of them before the Society (though not on that account less impressive to the observer himself); five or six cases however, more or less typical in their features, were related in detail, and in two of these the characteristic eruption of rose-coloured spots was detected; in all, the insidious commencement of the attack, its long duration, the absence of distinct remissions, the

state of the cerebral function, persistent diarrhœa, and tympanitic state of the abdomen, the tendency to relapse, and the prolonged convalescence, were together with the general youth of the patient, pointed out as the chief phenomena which seemed to indicate the real nature of the disease, and at the same time to distinguish it from the ordinary indigenous fever of the country. In one instance the *post-mortem* examination (the only one mode) revealed unequivocal evidence of the peculiar pathological changes of typhoid fever.

In passing on to the question of the existence of this disease in the tropical parts of India, the author stated that up to the year 1854, most writers on tropical diseases ignored or denied the existence of the common continued fevers of cold countries in warm climates, and he quoted to this effect, Annesley, Mackinnon, Martin, &c.; even Dr. Morehead was not inclined to admit the occurrence of typhoid fever in India, at the time the first edition of his work was published; since then however his opinion has been somewhat modified.

Having made a careful review of the writings of these and the older authors, Dr. Peet thought himself able to detect some instances of this form of continued fever, mentioning particularly one of Annesley's cases, and he pointed out how unfavourable the mode of treatment adopted in all fevers, at that time, was to the detection of typhoid fever, consisting as it did of large doses of calomel and frequent duratic purgatives, &c. Martin's statement of the frequent occurrence of intestinal ulceration in prolonged fevers amongst the labouring classes of natives in Calcutta was also referred to. The affection described by Twining in Bengal "as the insidious congestive fever of the cold season" appears to have presented, in some of its characters, a resemblance to typhoid fever, yet diarrhœa was rare and intestinal ulceration only occasionally found after death. Twining himself admits, on a review of the symptoms, "that they might establish a resemblance to some modification of the European typhus, although the resemblance be not strictly correct in all its details." Dr. Peet remarked on this passage: "these very sensible observations were written by Mr. Twining 27 years ago, and I am not aware of a single observation of any value having been since made to settle the very important question to which it relates." Recent writers differ in opinion as to the identities of the affection now referred to with typhoid fever; the author inclines to the affirmative, and in concluding this part of the subject observed that

sufficient evidence had probably been adduced to render it at least probable that typhoid fever has at all times occasionally occurred within the tropics, and been confounded with remittent fever or other diseases.

The first recorded cases of typhoid fever, as such, are by Mr. Scriven (January 1854); they happened in Burmah, the diagnosis being chiefly based on *post-mortem* appearances. Dr. Ewart afterwards recorded four cases which occurred in the Ajmere Jail, and subsequently Dr. Goodeve has written on the subject, and satisfactorily proved the existence of the disease in Bengal. Articles by Drs. Ranking and Cornish were also referred by the author in proof of its existence in Madras, and also the valuable observations of Dr. Hanbury published in the last volume of the Transactions of the Society. Passing on to the question of diagnosis, the author discussed the semeiological value of the rose-coloured eruption, the state of the abdomen, mode of invasion, long duration, and prolonged convalescence, &c. of typhoid fever, and with reference to one of its characteristic symptoms, the intestinal lesions, remarked, "if it can be established (and I think it very probable it may be so) that Peyer's glands are not implicated in malarious fevers any more than in typhus or relapsing fever, a very important step in diagnosis will have been made."

On a future occasion Dr. Peet proposes to offer to the Society some additional remarks on the prevalence of this disease in the Bombay Presidency.

In the discussion which followed the reading of the above communication, the Principal Inspector General took a prominent part, and observed that the subject was one not only of professional interest, but of great importance in a sanitary point of view, supposing that typhoid fever be attributable, in its origin and propagation, to neglect of sanitation, as some maintain.

The best thanks of the Society having been voted to Drs. Peet and Beatty for their valuable contributions, the meeting separated.

MONTHLY MEETING HELD 4TH OCTOBER 1862.

Present :

Dr. Peet, *President,* in the Chair.

Members.—Dr. Stovell, Principal Inspector General Medical Department; Drs. Johnstone, Broughton, Hyslop, Haines, Ballingall, Welsh, Diver; and Dr. Carter, *Secretary.*

The proceedings of the last meetings of the Committee and of the Society were read and confirmed.

Numbers of the "British Medical Journal" and of a new Journal lately commenced at Goa (politely forwarded by Mr. Roberto, the Editor) were laid on the table.

The first paper read was on Delirium Tremens as observed at the European General Hospital, from 1857-1862, by Dr. Leith, Deputy Inspector General of Hospitals, Belgaum. The author commences his interesting and valuable communication by explaining the grounds upon which he has been led to distinguish "delirium tremens" from the milder affection which he terms "ebrietas," and which corresponds to the first stage of the disease as commonly accepted; but the statistics of both affections are contained in his elaborate table showing the admissions and deaths during five complete years in the European General Hospital. From this table it is calculated that the ratio of mortality on the admissions was from delirium tremens 5.24 per cent., from ebrietas 1·47 per cent. and from delirium tremens and ebrietas together 2·20 per cent.; the total number of admissions being 772 and of deaths 17. The majority of the deaths were of the first species or that which follows a debauch more or less prolonged, and is attended with vascular excitement. The influence of *seasons* and occupation, the age of the patients, are next treated of, the latter being somewhat over the age of patients in general: the liquors the patients had been drinking was most commonly brandy. Dr Leith considers that all kinds of drink have a similar effect; it is the alcohol that is the pernicious agent, and to the quantity of it taken is to be attributed the disease in all its phases, it is erroneous to imagine that only the bad or drugged liquor does harm. The accession of delirium often comes on while drinking, but sometimes after an interval of 40 or 50 hours: occasionally a relapse of delirium takes place, and the author has collected no fewer than 23 cases in which this "secondary" delirium occurred, and he gives a striking example; five such cases were amongst the fatal ones, and in these the secondary delirium was of a violent character and ended in convulsions. Irritability of *stomach* was not frequent. No particular state of the *tongue* exclusively pertains to either variety of the disease, nor were the bowels in any uniform state: the *skin* is generally natural, sometimes hot, especially in fatal cases: *heat of head* is by no means invariable: *head-*

ache was seldom complained of, but in two cases it was severe and followed convulsion. Redness of the eyes was occasionally present especially after long sleeplessness: *pulse*—Dr. Leith well remarks the influence of position on the pulse; his figures were obtained when the patients were either lying or sitting; they show an average of from 80 to 100 per minute as the most common, in the fatal cases the pulse was over 100 and once upwards of 130. *Tremor* was generally present and sometimes severe: *convulsions* occurred in all the fatal cases except one, being succeeded by coma, and they indicate very great danger: *sleeplessness* was a constant feature of the disease and usually preceded it. The *delirium* varied much in character and degree, Dr. Leith gives an elaborate summary of his observations of this point, quoting numerous illustrations: *Vertigo* was often observed, and in relation with these symptoms the author remarks that two confirmed drunkards at length became insane. The duration of delirium is next treated of; it mostly lasted upwards of three days. The condition of the *pupil* of the eye has for many years been most carefully investigated by the author, who states, that in delirium tremens the pupil is abnormally large; it would be impossible to suggest precautions to avoid error not already adopted by the author; he observes that the pupil is double in size during the delirium, and to this last the increase is owing; when convulsions come on, the pupil widely dilates. Some most interesting cases illustrating his remarks are then given by Dr. Leith, but can only be referred to here. The subject of *treatment* next follows and the elaborate care exhibited in carrying this out so as to avoid injurious influences and assist the natural process of recovery, is most apparent in this part of Dr. Leith's paper; he states that he considers alimentation along with quiet to be the most important part of the treatment of delirium tremens. It is surprising, too, to find from Dr. Leith's observations, how well nourishing broths and other liquid food is retained by the patient when alcohol is withheld, and it may be at once stopped with safety: of this fact an example is given. Seldom was medicine required, and then only on account of complications or symptoms more urgent than usual: depletion Dr. Leith thinks seldom necessary, even in robust men suffering from the effects of a single debauch; in one case chloroform failed to procure sleep, once it succeeded; opiates were never given with this intention.

All the eleven patients who died were habitual drunkards: three had

fever, probably the result of exposure to the sun, violent delirium, convulsions, and coma quickly followed, three had convulsions on their admission, in four they subsequently came on, one patient sank exhausted from a complication of chronic dysentery; Dr. Leith furnishes a table of the post-mortem appearances. The conjested condition of the stomach and lungs is mentioned as perhaps due to the state of the pneumogastric nerve, in this particular mode of death; only once were the renal organs found diseased. The mean time patients were kept in hospital was nine days,—more than the treatment required, but prolonged from humane motives.

2. The other communication read to the Society was by Dr. Ballingall on the subject of Elephantiasis of the Scrotum. It contained the result of the author's recent experience, being an addition to his previous paper on the same subject; since then (1858) Dr. Ballingall has operated successfully on ten cases; in two the tumours being of large size, one of these cases was then described more fully and the method adopted for removing a mass weighing upwards of 100 pounds (106¼ lbs.) the patient completely recovered. In a second instance described by the author some difficulties arose from the presence of hernia. Amongst other remarks the beneficial effects of change of air to the Deccan was pointed out, also the fallacy of the popular notion that Elphantiasis is due to a fish diet.

A discussion followed the reading of these two papers and the best thanks of the meeting were unanimously voted to Drs. Leith and Ballingall. It is intended that both communications be printed in the next volume of the Transactions of the Society.

MONTHLY MEETING HELD 1st NOVEMBER 1862.

Present.

Dr. Peet, *President*, in the Chair.

Drs. Giraud and Haines, *Vice-Presidents.*

Members.—Dr. Stovell, Principal Inspector General Medical Department; Drs. Thom, Hanbury, Broughton, Hyslop, Welsh; and Dr. Carter, *Secretary.*

The minutes of the last meeting were read and confirmed.

Letters from Dr. Seward intimating his request to become a member of the Society; from Dr. Mee, Surgeon of H. M. 44th Regiment, expressing the same wish; from Dr. Skues, of H. M. Depôt, Kurrachee, and from the Secretary of the Geographical Society of Bombay, were then read.

The donations presented were the last "Mortuary Returns" by the Principal Inspector General; numbers of the "Chemist and Druggist" and "British Medical Journal," by the Editors, &c.

The first communication on the list was "On the conversion of calomel into corrosive sublimate, by ammoniacal salts," by Dr. Haines. The author introduced his subject with some remarks on the ready decomposition of the sub-compounds of mercury into protosalt and metal; even light alone thus acts upon the suboxide and subiodide, but not, as it fortunately happens, upon the sub-chloride or calomel, otherwise the exhibition of this remedy might be attended with most serious results. This influence of light is really one of reduction, or deoxidation, such as is witnessed in its effects upon the oxides of silver and gold, &c., only in the case of the mercurial salts mentioned the nascent halogen or oxygen reunites with part of the unchanged compound, converting it into a protosalt: it may be supposed that the evolution of oxygen by the leaves of plants on exposure to light is owing to a similar process of deoxidation, and not dependant upon vital action. The power of ammoniacal salts, and especially of the carbonate, to convert calomel into corrosive sublimate has been already recognized, and from a recorded fatal case it would seem that the neutral hydrochlorate has a similar effect, the patient (a child) having died from the effects of some powders containing calomel and sal-ammoniac. Dr. Haines gave some account of a late instance he had become acquainted with, in which an adult European soldier, suffering from remittent fever, but progressing favorably, had been submitted by a second Medical officer to treatment by calomel pills, and carbonate of ammonia in solution with the acetate; four doses of the pills and draughts, taken simultaneously, were administered, but after the second, symptoms of gastric irritation came on, and in two or three days the man died; after death inflammation and sloughing of the mucous membrane of the stomach and fauces were found to have taken place. It was then shown that it was highly probable that the draughts administered contained a large excess of the alkaline carbonate of ammonia, notwithstanding that the solution

of the acetate had been ascertained to be acid in reaction, and the author proceeded to describe some interesting and conclusive experiments he had himself made for the purpose of inquiring into the action upon calomel of the acetate and carbonate of ammonia, and he showed that the sub-chloride (calomel) is to a slight extent changed into the chloride (corrosive sublimate) even by the neutral acetate aided by a temperature of 98° to 102° F.; but the conversion is much more marked when carbonate of ammonia was in excess; while if the solution were acid, hardly any change occurred, and none at all in calomel placed in distilled water under the same circumstances: from quantitative analysis it was estimated then in the case in question from 6 to 8 grains of the poisonous sublimate may thus have been formed in the stomach, and in conclusion the author pointed out the inadvisability of prescribing simultaneously calomel and acetate of ammonia, especially when the latter is alkaline in reaction.

Much interest was expressed by the members of the Society on this subject, different opinions being advanced as to the cause of death in the case referred to; it is not an uncommon practice to order the two substances mentioned, at the same time, and no injurious effects follow; still the actual occurrence of an instance like the above was considered to demand the earnest attention of the Society, and at the suggestion of Dr. Stovell, a Sub-Committee consisting of Drs. Peet, Giraud, and Haines, with Dr. Carter as Secretary, was formed, for the purpose of ascertaining, by direct experiment upon the lower animals, the circumstances under which calomel may thus be changed by the salts of ammonia into the far more irritant salt, the possibility of such a conversion outside the body having been satisfactorily demonstrated by Dr. Haines.

The next communication, presented by the Principal Inspector General of the Medical Department, was entitled "Remarks on Sanitary subjects with special reference to Mahableshwur," by Deputy Inspector General Grierson. The author prefaced his remarks by some general considerations on the proper method of studying subjects belonging to man in his individual and social relations: human nature is to be studied in its totality. As regards the relation in which man stands to the material world around him, the primitive commandment to dress and keep the earth, the latter embracing, as the Hebrew word "Shamr," implies, the preservation of the soil, was insisted on by

the author who pointed out the loss that ensues to the soil, if the substances abstracted from it by animals and man are not returned to it, as well as the direct injury that may result from their decomposition, if not thus properly disposed of. Further, man was to multiply and fill the earth, and this can only be done under conditions dependant on the processes of industry as they are connected with double office of agriculture; these conditions unfulfilled, moral and physical degradation inevitably ensues. Turning to practical matters and the application of these views, the author limited himself to considering the disposal of effect and waste matters which prove so noxious if unattended to, by polluting the air around our habitations; the sources of evil are our latrines, bath-rooms, kitchens, and stables. This actual condition of the ordinary "bawarchi khana," its foul sloppy sink just outside the wall, &c. were referred to, the contents of the latter should be daily removed by means of a shifting receptacle; so also the water from bath-rooms should be at once carried away; and as to latrines, the common native plan is every way objectionable, closed dammered vessels or tubs should be substituted, lodged in the ground, and daily emptied and cleansed; extra work and trouble will be thus entailed, but this should be no argument against the adoption of obvious sanitary measures; public carts could be made to regularly convey away these products to places where for agricultural purposes their marketable value would be considerable. The same with the refuse of the stable, it should be employed as a manure or else burnt, but never allowed to accumulate near a house. As regards the management of large bodies of men or horses, the same principles apply, for the men, closed sunken tubs should be employed, &c.; as to bazars it is easy to estimate the quantity of excreta by multiplying the number of inhabitants by three and changing the total into pounds weight. One or more separate public latrines, for each sex apart, should be erected, enclosed and divided off, and the excreta conveyed to covered trenches, where after some months it becomes excellent and inoffensive manure. These remarks were originally applied to Mahableswur by the author, who further recommends some collateral improvements in that locality by removing superfluous jungle, burning rank under-growth, ferns, &c. by which a valuable amount of potash might be obtained; a plentiful supply of water and roads for the carriage of merchandize, are also essential. The Government which rises to the conception of its duty in these matters

attaches to itself the wise and good, who admire and support it, while it reaps the higher glory of scattering with bountiful hand benefits amongst the poor.

In the discussion which ensued it was remarked by Dr. Broughton that the Chinese gardeners of Mahableshwur were well acquainted with the value of manure, which they sedulously collect and even purchase, whilst the exuberant fern-growth is mostly expended in packing the potatoes annually deported from the hill.

The third paper on the list was deferred till the December meeting of the Society, when the President will also contribute the second part of his remarks on typhoid fever, and having voted the best thanks of the meeting to Drs. Grierson and Haines, the members separated.

MONTHLY MEETING HELD 6TH DECEMBER 1862.

Present.

Dr. Peet, *President*, in the Chair.

Dr. Haines, *Vice-President.*

Members.—Dr. Stovell, Principal Inspector General Medical Department; Drs. Larkins, Hanbury, Johnstone, Coles, Hyslop, Welsh, Birdwood, and the *Secretary*.

The minutes of the last meeting were read and confirmed.

A letter from Surgeon Gibbon, H. M.'s 96th Regiment, was read, intimating his wish to become a member of the Society.

The following presents and donations were laid on the table: An Official Report by Dr. Lyons on the Yellow Fever lately prevalent at Lisbon, and the Mortuary Return of Madras for 1860, forwarded by the Principal Inspector General of the Medical Department; the General Report in the Prisons of the Bombay Presidency presented by Government, and the Bombay Magnetical and Meteorogical Observations for 1861, by the Superintendent of the Government Observatory: Numbers of the "Madras Quarterly Journal of Medicine," the "Journal de Pharmacia é Sciencias Medicas," the "British Medical Journal," and the "Chemist and Druggist," presented by the respective Editors.

The Principal Inspector General had kindly forwarded for the use of the Society Dr. Niven's account of cases resembling Typhoid Fever, which was read at the same meeting, and also the notes of a fatal case occurring in the Artillery, and Dr. W. J. Moore had favoured the Society with a communication on the subject of Hypatic Abscess, to be

read at the next ordinary monthly meeting. The second part of Dr. Peet's paper on Typhoid Fever, referring to the prevalence of this disease in the Bombay Presidency, was then read. As it is intended that the whole of this valuable communication shall appear in the next volume of the Society's Transactions, it will not be necessary to record here more than a brief statement of the conclusions elicited by the author from the careful and extended inquiries, of Dr. Peet; it would appear that there is nothing in the experience of the Jamsetjee Jejeebhoy Hospital, and but little in that of the European General Hospital at Bombay, or of the Hospital of certain European Corps, to warrant the inference that typhoid fever is otherwise than a very rare disease in the Presidency; the records of the Jamsetjee Jejeebhoy Hospital, in particular, are wanting in evidence to the contrary; a circumstance which would hardly have been anticipated, when it is recollected that typhoid fever certainly prevails to some extent amongst the inhabitants of Bombay. Dr. Niven's cases, four in number, and all occurring in European Soldiers, having been read by the Secretary, a discussion followed, in which many of the members present took an active part.

The sense of the meeting was to the effect that our information on the whole subject of this important disease is as yet too scanty to admit of trustworthy inference, and that it is highly desirable that medical officers in all parts of the Presidency would interest themselves in acquiring accurate data as to the presence and detection of typhoid fever; in order that its mode of origin being better known, the right means of prevention and all sanitary precautions, may be employed with definite precision, and the use and necessity of such measures be thus made more generally apparent; as a subject more immediately of professional interest, it has also every claim upon our attention.

At the close of the meeting the Secretary drew attention to some facts which seemed to explain the true characters of the Fungus growth, the cause of the disease for which he had proposed the term "Mycetoma." A communication from the Rev. Mr. Berkeley on the subject was referred to; this gentleman had applied the name *Chionyphe (Mucor ?) Carteri*, to the red mould which so often makes its appearance on specimens of this disease (*see* the last volume of the Transactions, page 220) and which it is probable is the parent so to speak of the Fungus of Mycetoma, its growth in the human foot or hand undergoing modifications which more or less resemble those presented by

many parastic fungi (the so-called sclerotoid condition) under unusual or unfavourable circumstances ; in the districts where the Fungus disease prevails, this red mould may possibly be detected on the soil, especially if looked for just before the commencement of the rains. Some coloured drawings in illustration of the subject were laid upon the table.

The best thanks of the meeting were afterwards accorded to Dr. Peet, and the other contributors and donors : it was then announced that the annual meeting of the Society would be held on the 10th instant.

ANNUAL MEETING HELD 10TH JANUARY 1863.

Present.—Dr. Peet, Dr. Coles, and W. Thom, Esq.

The following report for the past year was, in the unavoidable absence of the Secretary, read by Dr. Coles.

1. During the year 1862 the full number of monthly meetings of the Society has been held, the attendance at which has been quite equal to the average. The number of contributions to the Proceedings has been fully adequate, and amongst them may be especially mentioned those of Mr. HANBURY, Dr. PEET, Dr. LEITH, Dr. GRIERSON, Dr. HAINES, and Dr. BALLINGALL. The Society is also much indebted to the present head of the Medical Department for numerous valuable minor contributions, besides some of the more important ; and many official Reports, &c. containing matters of varying interest.

2. Six new paying members, of whom four belong to H.M.'s British Forces in India, have joined the Society since the previous year ; one member has withdrawn. No additions have been made on account of Assistant Surgeons first entering the Indian Army.

3. During the recess of the past Session changes occurred amongst the office bearers of the Society by the retirement, on departure for England, of Mr. Carter, the President, and Dr. Coles, the Secretary ; on those occasions the Society felt it incumbent to place on record their sense of the valuable services rendered by these gentlemen in promoting its interests. Dr. Peet was elected President in July, and Dr. Carter, Secretary. On account too of changes amongst the members of the Committee of Management, Dr. Johnstone and Dr. Mead were brought on the Committee, in accordance with Regulation XV.

4. The Committee of Management have proposed certain alterations in the rules of the Society, which have been duly submitted to the

ordinary members for decision, and votes of the latter on the two proposed changes will be ascertained at the present meeting.*

5. The seventh number (new series) of the Transactions was issued in the early part of the year, and the printing of the volume for 1862 is proceeding with despatch.

6. Several additions have been made to the Library of the Society on the part of Government, original authors, and editors of various medical periodicals, amongst which latter may be mentioned a new Portuguese Journal, published at Goa. On two occasions, Government has directly addressed the Society with reference to subjects of practical and scientific importance.

7. The following table will show the state of the finances at the close of the past year :—

ANNUAL STATEMENT *of* RECEIPTS *and* DISBURSEMENTS *of the* MEDICAL *and* PHYSICAL SOCIETY, *from* 1*st January to* 31*st December* 1862, *inclusive.*

RECEIPTS.						DISBURSEMENTS.					
	Rs.	*a.*	*p.*	*Rs.*	*a.*	*p.*		*Rs.*	*a.*	*p.*	*Rs.*	*a.*	*p.*
To Balance of last account closed on the 31st December 1861.	.....			1,500	13	4	By Amount paid for Printing Circulars, and of office Establishment and Petty charges, &c.	382	13	9			
To Subscriptions received from 1st January to 31st Dec. 1862..	1,094	12	0				By Amount paid for Printing charges, of No. 7 of new series of the Transactions.	1,023	12	0			
To Amount received from Government, being the value of 100 copies of No. 7 of the new series of the Society's Transactions.	500	0	0				By Purchased a Government Promissary note at 5 per cent.	1,020	3	4			
				1,594	12	0					2,426	13	1
							By Balance in the Bombay Bank..	.....			668	12	3
Total..Rs.	.....			3,095	9	4	Total..Rs.	.....			3,095	9	4

* *The proposed alterations were agreed to by a large majority.*

Upon the examination of the votes recorded, the following Gentlemen were found to be elected members of the Committee of Management :—

Dr. Peet, Dr. Giraud, Dr. Coles, Dr. Haines, W. G. Hunter, Esq., Dr. Birdwood, Dr. Moore, and Dr. Carter.

The election of office bearers then took place, when Dr. Peet was elected *President*; Dr. Giraud and Dr. Haines, *Vice-Presidents*, and Dr. Carter, *Secretary*.

H. V. Carter,
Secretary.

Bombay:
Medical and Physical Society's Rooms,
January 1863.

REGULATIONS

OF THE

MEDICAL AND PHYSICAL SOCIETY OF BOMBAY.

ESTABLISHED 1835.

Objects.

I. The encouragement of the cultivation of Medical Science and its collateral branches, by discussion at periodical meetings, and by the publication of original communications.

Constitution.

II. The Society is composed of Ordinary, Corresponding, and Honorary Members.

Ordinary Members.

III. Under the head of Ordinary Members, are to be classed all who contribute to the funds of the Society, and all who are admitted in accordance with Regulation VII.

IV. All Medical men residing in India, who can produce certificates of a regular medical education, are eligible as Ordinary Members.

V. Medical Officers of Her Majesty's Indian or British Services are elected Ordinary Members of the Society, on application by letter addressed to the Secretary.

VI. Qualified Medical Practitioners, not belonging to Her Majesty's Indian or British Services, are elected by ballot at the ordinary meetings of the Society, and a majority of three-fourths of the Members present is necessary to secure the election.

VII. Assistant Surgeons of either the British or Indian Service, on first arrival at the Bombay Presidency, are considered Ordinary Members of the Society, free of payment of annual subscription, and continue so for a period of one year, after which, should they not intimate their wish to be considered Ordinary Members by payment of the regulated annual subscription, they are considered to have withdrawn from the Society.

Payments.

VIII. Ordinary Members pay an annual subscription of Rupees 12, payable in advance, in the month of January of each year.

IX. Ordinary Members, absent from India, are not chargeable with subscriptions for the period of their absence.

X. Ordinary Members, neglecting to pay their annual subscription for two successive years, are considered to have withdrawn from the Society, and are liable to have their names erased from the list of Members, under a resolution passed to that effect at an ordinary meeting of the Society.

Corresponding Members.

XI. Ordinary Members, on retiring from service in India, on being proposed and seconded at an ordinary meeting of the Society, are eligible, by ballot, as Corresponding Members. A majority of four-fifths of the Members present is necessary to secure their election.

Honorary Members.

XII. Medical men of celebrity, not residing in India, are eligible as Honorary Members. On being proposed and seconded at an ordinary meeting of the Society, they may be elected at the next meeting by the unanimous consent of the Members present.

Election of Office-bearers.

XIII. The Committee of Management of the Society consists of eight Members, elected annually from among the Ordinary Members resident in Bombay, by the general vote of the Ordinary Members residing under the Government of Bombay.

XIV. The Voting Lists are circulated in the first week of November of each year, and the result of the election is declared at the annual meeting of the Society.

XV. In the event of vacancies occurring in the Committee between the periods of election, such vacancies to be filled up in rotation by the individuals who commanded the number of votes next to those of the Members returned at the last election.

XVI. A President and two Vice-Presidents of the Society are elected annually from among the Members of the Committee of Management by the Members of the Society present at the meeting at which the annual election of the Committee is declared.

XVII. The Secretary of the Society is elected biennially from among the Ordinary Members resident in Bombay at the annual meeting held in the month of January of alternate years, or, on the occurrence of a vacancy, at any other ordinary meeting of the Society.

Committee of Management.

XVIII. The Committee of Management have the general direction of the affairs of the Society, and decide on what communications are to be published in the Transactions of the Society. They keep minutes of all their proceedings, which are entered into the Minute-book of the Society and read at the following ordinary meeting.

XIX When questions of importance to the stability and interests of the Society arise, they shall be submitted by the Committee for decision to the Ordinary Members residing *under the Government of Bombay*. The majority of votes necessary to decide any question, to be determined according to its importance, and fixed at the time by the Committee.

XX. It shall form part of the duty of the Committee to give due consideration to all suggestions offered by Members of the Society. Should it be represented to the Committee that the conduct of a Member of the Society is disgraceful, in a professional or social capacity, the Committee may, if they deem it necessary, bring the question of his expulsion before a Special Meeting of the Society, at which the votes of three-fourths of the Members present are necessary to decide it affirmatively.

President and Vice-Presidents.

XXI. The President shall take the Chair and conduct the business at all meetings of the Society.

XXII. In the absence of the President, one of the Vice-Presidents shall take the Chair, and conduct the business of the Meeting; and in case neither be present, the senior Member at the meeting shall preside.

Secretary.

XXIII. The Secretary is a Member of the Committee of Management *ex-officio*.

XXIV. It shall be his duty to enter into the Minute-book of the Society minutes of the proceedings of all meetings and transactions of the Society, and in communication with the Committee of Management, to conduct the details of business, and carry on the correspondence of the Society.

XXV. The Secretary shall prepare an annual statement of the receipts and disbursements of the Society, to be laid before the annual meeting in the month of January of each year.

XXVI. To enable the Secretary to perform these duties, a suitable establishment is entertained, under the sanction of the Committtee of Management, confirmed at an ordinary meeting of the Society.

Meetings.

XXVII. Ordinary meetings of the Society are held in Bombay on the first Saturday of every month, except in April, May, and June.

XXVIII. The Chair being taken, the order of business shall be as follows:—

1. The minutes of the last meeting, and those of subsequent Committee meetings, to be read and confirmed.
2. The announcement and election of new Members, in accordance with Regulations V., VI., and VII.
3. The election of Corresponding and Honorary Members.
4. The reading of letters, and the discussion of any ordinary business of the Society which may be before the meeting.
5. The announcement of presents and donations.
6. That of papers and dissertations received since the last meeting.

XXIX. After the announcement of the papers and dissertations, the President shall call upon the Secretary to read one or more of them, and shall subsequently

invite the Members to discuss any particular part of them which they may consider deserving of remark.

XXX. No new business shall be introduced until that which is before the meeting has been concluded.

Papers and Dissertations.

XXXI. All papers and dissertations presented to the Society to be considered the property of the Society.

XXXII. The Transactions of the Society are published by the Secretary, in communication with the Committee, as often as circumstances will admit.

XXXIII. A copy of each publication is presented to the Honorary and Corresponding Members of the Society, and to every Ordinary Member who at the time of publication is a contributor to the funds of the Society.

N. B.— All communications addressed to the Secretary or Treasurers must be pre-paid.

Members are requested to pay the amount of their subscriptions to the Bank of Bombay, Treasurers to the Society.

☞ The Publications of the Society are for sale by Messrs. J. CHESSON and WOODHALL, Booksellers, Bombay, the Society's Agents.

The First Series of the Transactions of the Society consists of—

No. 1, 1838	Pp. 370	Rs.	5
„ 2, 1839	„ 269	„	5
„ 3, 1840	„ 225	„	3
„ 4, 1841	„ 156	„	3
„ 5, 1842	„ 196	„	3
„ 6, 1843	„ 250	„	3
„ 7, 1844	„ 206	„	3
„ 8, 1845-46.....	„ 122	„	3
„ 9, 1847-48.....	„ 264	„	5
„ 10, 1849-50.....	„ 338	„	5
The Index to the above		„	1

The Second Series of the Transactions consists of—

No. 1, 1851-52.....	Pp. 356	Rs.	5
„ 2, 1853-54.....	„ 362	„	5
„ 3, 1855-56	„ 389	„	5
„ 4, 1857-58.....	„ 389	„	5
„ 5, 1859	„ 349	„	5
„ 6, 1860	„ 484	„	5
„ 7, 1861	„ 349	„	5

MEDICAL AND PHYSICAL SOCIETY OF BOMBAY,

FOR THE YEAR 1863.

Patrons.

The PRINCIPAL INSPECTOR-GENERAL MEDICAL DEPARTMENT.

The DEPUTY INSPECTOR-GENERAL OF HER MAJESTY'S HOSPITALS, BOMBAY.

President.

J. PEET, M.D., F.R.C.P.

Vice-Presidents.

H. GIRAUD, M.D. | R. HAINES, M.B.

Committee of Management.

The PRESIDENT, the VICE-PRESIDENTS, and the SECRETARY.

W. C. COLES, M.D. | G. BIRDWOOD, M.D.
W. G. HUNTER, ESQ. | W. J. MOORE, M.D.

Secretary.

H. V. CARTER, M.D.

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J. SYME, Esq., F.R.S.E., Edinburgh.
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BARON LIEBIG, M.D., of Munich.
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W. FERGUSSON, Esq., F.R.S., &c., London.
Sir C. LOCOCK, M.D., F.R.S., &c., London.

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(Late of the Bombay Medical Service.)

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H. JOHNSTONE, Esq.
J. MCLENNAN, M.D.
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J. WALKER, Esq.

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H. Atkins, Esq.
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